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U.S. Public Health Service

CONTAGIOUS AND INFECTIOUS DISEASES AMONG THE INDIANS

LETTER FROM

THE SECRETARY OF THE TREASURY

TRANSMITTING,

PURSUANT TO LAW, A REPORT BY THE PUBLIC HEALTH SERVICE OF INVESTIGATIONS MADE IN ACCORDANCE WITH AN ACT OF CONGRESS, APPROVED AUGUST 24, 1912, INTO THE PREVALENCE OF CONTAGIOUS AND INFECTIOUS DISEASES AMONG THE INDIANS OF THE UNITED STATES

JANUARY 27, 1913.—Referred to the Committee on Indian Affairs and ordered to be printed, with illustrations

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U. S. Public Health Service

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LETTER OF TRANSMITTAL.

Treasury Department,
Office of the Secretary,
Washington, January 23, 1913.

Sir: I have the honor to transmit herewith a report, together with recommendations by the United States Public Health Service, submitted in accordance with the act of Congress approved August 24, 1912, providing for an investigation into the prevalence of contagious and infectious diseases among the Indians of the United States.

Respectfully,

Franklin MacVeagh,
Secretary.

The President of the Senate.

THE PREVALENCE OF CONTAGIOUS AND INFECTIOUS DISEASES AMONG THE INDIANS OF THE UNITED STATES.

INTRODUCTORY STATEMENT.

In the act approved August 24, 1912, making appropriations for the current and contingent expenses of the Office of Indian Affairs, for fulfilling treaty stipulations with various Indian tribes, and for other purposes, for the fiscal year ending June 30, 1913, there was included the following provision:

> *Provided,* That the sum of ten thousand dollars, or so much thereof as may be necessary, is hereby appropriated, out of any money in the Treasury not otherwise appropriated, to enable the Public Health and Marine-Hospital Service to make a thorough examination as to the prevalence of tuberculosis, trachoma, smallpox, and other contagious and infectious diseases among the Indians of the United States, full report to be made to Congress not later than February first, nineteen hundred and thirteen, with such recommendations as may be deemed advisable.

In accordance with the directions contained in this law steps were taken to make the necessary investigations, the work being conducted through the Division of Scientific Research and under the immediate supervision of Asst. Surg. Gen. J. W. Kerr, in charge of that division.

The Indian population is widely scattered, persons of this race residing in practically every State, and Indian reservations are located in at least 25 States. According to official figures of the Bureau of Indian Affairs, the total Indian population in the continental United States is 322,715.[1] It was determined to have visited and examined as large a number of these Indians as practicable and as would furnish data to show the prevalence of contagious and infectious diseases among them.

On account of the large area to be covered, it was necessary to divide the country into districts, and assign an officer to each district. The following were the officers detailed, and their respective districts by States:

Passed Asst. Surg. B. J. Lloyd: Washington, Idaho.
Passed Asst. Surg. W. C. Billings: Northern California, Oregon, Nevada.
Passed Asst. Surg. L. D. Fricks: Arizona, North Carolina.
Passed Asst. Surg. F. C. Smith: Colorado, New Mexico.
Passed Asst. Surg. M. C. Guthrie: Oklahoma.
Passed Asst. Surg. R. A. Herring: Kansas, Nebraska, Wyoming, Utah, southern California.
Surg. M. J. White: Iowa, Montana.
Passed Asst. Surg. J. W. Schereschewsky: North Dakota, part of South Dakota.
Passed Asst. Surg. Paul Preble: South Dakota.
Surg. Taliaferro Clark: Minnesota, Michigan, Wisconsin, Pennsylvania.
Asst. Surg. J. P. Leake: New York.
Surg. H. S. Cummings: Virginia.
Asst. Surg. Gen. W. C. Rucker: Florida.

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[1] The Bureau of the Census for 1910 gives 265,683 as the total Indian population.

Prior to undertaking the inspections each officer made a preliminary study of the situation in his territory in order to arrange his itinerary and survey so as to collect the greatest amount of data practicable within the time allotted, which was until January 1, 1913.

In the above-quoted law three diseases are specifically mentioned, namely, tuberculosis, trachoma, and smallpox. Special attention was accordingly devoted to these diseases with the view to determining their past and present prevalence, and data were also collected bearing on the incidence of other contagious and infectious diseases among the Indians.

While it was impracticable on account of varying local conditions to outline the extent of the investigations and the methods of making them in a particular district, instructions were issued that, in general, the studies should include: First, examinations of the morbidity and mortality records available at each general Indian agency visited; second, inspections of all pupils of nonreservation schools, boarding schools, day schools, and mission schools; third, visits to sanatoria, asylums, and other eleemosynary institutions within the reservations devoted to the care of Indians; fourth, house-to-house inspections of as many Indian families as practicable and representative of the general population to determine the prevalence of the communicable diseases mentioned and their character.

In letters of instructions the several officers were also directed to confer whenever practicable with the respective State health authorities, with a view to securing any information available, and particularly data in respect to cases of sickness and death and the occurrence of epidemics on or near Indian reservations.

During their inspections the several officers were required to observe and to inquire into the insanitary conditions and habits of life among the Indians that would have a bearing on the propagation and spread of contagious diseases, and provision was made for the taking of photographs which would convey some idea of the insanitary conditions met with.

Finally, each officer was instructed to consider carefully the public health problems presented, with the view to suggesting methods of handling them.

The investigations were begun in Oklahoma September 28, 1912, and as soon thereafter as possible in the other States. On account of the immense territory to be covered, the brief period of time available, and the limited number of officers that could be assigned to the duty, the inspections were necessarily somewhat restricted in character. Nevertheless, it is believed that a sufficient number of reservations were visited and Indians examined to determine the general prevalence of contagious and infectious diseases among them, and to observe the insanitary conditions that contribute to the spread of those diseases.

On completion of the field investigations December 30, 1912, it was found that a total of 39,231 Indians had been inspected. The results of these inspections are embodied in this report, all of the data collected by the several officers having been collated and condensed by Asst. Surg. Gen. J. W. Kerr, Surg. Taliaferro Clark, and Passed Asst. Surg. J. W. Schereschewsky, who acted as reporters.

The recommendations, in which I concur, are the sum of the recommendations of the several officers. They deal with conditions which in many instances are a serious menace to the welfare of the Indian, and should be vigorously met in his interest and in the interest of the public health.

ACKNOWLEDGMENTS.

Prior to undertaking the work, request was made of the Office of Indian Affairs for such cooperation on the part of its officers and employees as might be practicable. Acknowledgment is due and here made for the cordial assistance received from the Office of Indian Affairs and its personnel in the field. Without such assistance, particularly in respect to providing traveling facilities and the assembling of the Indians, the investigations would have been extremely difficult, if not well-nigh impossible.

RUPERT BLUE,
Surgeon General.

JANUARY 23, 1913.

SCOPE AND METHODS OF INVESTIGATION.

As pointed out in the introductory statement, the investigations herewith reported upon covered practically the entire geographical limits of the continental United States, field inspections having been conducted in 25 States. These States were grouped into districts to correspond with the number of officers assigned to the work.

In so far as possible, these arbitrary districts comprised adjoining States, but this was not always practicable, other considerations, such as density of Indian population, facilities of transportation, and limitations of time, being necessarily taken into account. For the most part the data collected have been classified by States, but reference is occasionally made to districts because of varying climatic conditions, tribal customs, and the relations of Indians to white populations.

The investigations involved the visiting by the officers engaged in the work of many places where Indians were domiciled. Individual reference is made in the text to many of these places at which peculiar conditions were found.

DISEASES SUBJECT TO INVESTIGATION.

During the investigations inspections were made and data collected upon which to base estimates of the prevalence of contagious and infectious diseases, such as measles, scarlet fever, typhoid fever, and pneumonia. Such observations as practicable were also made to determine the prevalence of skin affections and venereal diseases.

It soon became evident, however, that the two diseases most prevalent among practically every Indian tribe were tuberculosis and trachoma. These diseases and smallpox, accordingly, required most attention because they are specifically mentioned in the law authorizing the studies and because their presence on reservations is so intimately associated with the social and sanitary conditions of the Indians.

During the medical examinations lookout was also kept for other diseases which, while not considered infectious, are of great interest from an epidemic standpoint. Among these may be mentioned goiter and pellagra.

DIFFICULTIES ENCOUNTERED IN MAKING INSPECTIONS.

Considerable difficulty was experienced in collecting the data herewith submitted because of the season at which the investigations were undertaken, the wide areas over which the Indians are scattered upon reservations, and the inaccessibility of places where Indians are located. Long distances were traveled by the several officers on foot, on horseback, by teams, motor cars, and motor boats.

One obstacle to be overcome in connection with several tribes was their diffidence, distrust, or reluctance to submit to examinations. Certain Indians had a manifest objection to furnishing information about themselves, and were loath to permit physical examination, either because of prejudice against exhibiting bodily defects and diseases, or for fear of subjecting themselves to some malign influence.

Nevertheless, there were examined a total of 39,231 Indians, and it is thought that this number is sufficient to enable correct inferences to be drawn as to the prevalence of contagious and infectious diseases among them.

It is altogether likely that more prolonged observations and repeated examinations would have resulted in the detection of additional cases, but under the circumstances this was impracticable. The percentage of disease stated for any particular group of Indians may therefore be accepted as a conservative one.

METHODS OF INVESTIGATION.

It was necessary to take advantage of every opportunity of making examinations. Upon arrival at an Indian reservation or school therefore, the officer engaged in the work conferred with the superintendent as to the best methods of reaching the greatest number of Indians in the short time available. As a result, Indians were either collected at the various subagencies or day schools on specified dates, and there examined, or they were visited in their camps and houses, the method varying according to the circumstances of the weather, the attitude of the Indian toward inspections, the density of population, traveling facilities, etc.

A considerable number were examined along the roadside as they were met, and advantage was also taken of the assembling of Indians at the various subagencies where rations were distributed, in order to examine relatively large numbers. All boarding schools and as many day schools as possible were visited and carefully inspected as to the incidence among the pupils of the diseases in question.

At all the reservations where Indians were collected for examination in the manner described, a certain amount of house to house inspection was also conducted in order to check the results arrived at by the collective examinations and to observe any conditions favoring the spread of disease. In some instances, however, local conditions rendered the extent of such inspections limited and even impracticable.

All records as to the past and present prevalence of disease, available at the agencies and schools visited, were examined and abstracted. Wherever practicable, the records of State boards of health were consulted and the executive officers of those boards conferred with in order to obtain any information available as to the incidence of infectious diseases among Indians and the occurrence of epidemics on or in the vicinity of Indian reservations.

METHODS OF EXAMINATION.

In general, the methods of examination were similar to those observed in detecting diseases and disabilities among arriving aliens. All of the officers assigned to the work had had large experience in such examinations, and were thoroughly familiar with the manifestations of trachoma. In every case the eyelids were everted, and the interior of the eyelids inspected for the disease. The rest of the eye and its appendages were also scrutinized for evidences of diseased conditions.

Whenever indicated by the physical appearance or family history, a general physical examination was made in order to detect the presence of tuberculosis and other diseases. In school children the oral cavity and region of the neck were inspected in order to detect glandular tuberculosis and to discover conditions provocative of ill health, such as carious teeth, enlarged tonsils, adenoids, chronic inflamation of the nose and throat, etc.

A sufficient number of arms were also inspected in order to determine the thoroughness of vaccination and the necessity of instituting additional prophylactic measures against smallpox. Finally, attention was paid to the general sanitary conditions in schools and on reservations, with special relation to housing conditions, food supply, social and personal habits and customs tending to favor the spread of disease among the Indian population.

As a result of these investigations it became evident that trachoma see p. 73 and tuberculosis are veritable ~~sources~~ scourges of the Indian race, the former being the cause of much suffering, reduction of physical efficiency and retardation of educational development on account of damage or destruction of vision, and the latter bringing about destruction of body tissues, crippling, and early death.

In presenting the data collected, the following phases of the sanitary situation among the Indians will be considered in their order.

1. The prevalence of trachoma.
2. The prevalence of tuberculosis.
3. The prevalence of smallpox and extent of vaccination.
4. The prevalence of other infectious and contagious diseases among the Indians.
5. Sanitary conditions on Indian reservations.
6. Sanitary conditions in Indian schools and their influence on the prevalence of diseases.
7. The significance from a public-health standpoint of the prevalence of contagious and infectious diseases.
8. Summary, conclusions, and recommendations.

In addition to the above a section has been included dealing briefly with the nature and effects of trachoma. This disease has in the past been considered very uncommon in the interior of the United States.

The public generally are not familiar with its manifestations, and recent discoveries have begun to bring out the importance of the disease from a public-health standpoint. A section dealing with the bearing of the prevalence of communicable diseases among the Indians on other races and a section on the medical branch of the Office of Indian Affairs have also been included.

The Nature of Trachoma and Its Effects on the Individual.

Before presenting the data collected bearing upon the prevalence of trachoma it is pertinent to describe briefly the disease and the degree to which it may impair the physical and economic efficiency of any race suffering from its ravages.

DEFINITION OF TRACHOMA.

Trachoma, or granular lids, is a disease of the conjunctiva or lining membrane of the eyelids, chronic in character and prone to remissions and exacerbations. The disease is characterized by an inflammatory onset, which is followed by an inflammatory deposit or thickening of the structures of the eyelid. The inflammation causes destruction more or less complete of the conjunctival tissues, so that scar tissue is formed, which has a marked tendency to contraction.

HISTORICAL NOTE REGARDING TRACHOMA.

Trachoma is regarded as a disease of oriental origin. Our knowledge of its existence extends far into the past, references to it having been found in the writings of the ancient Greeks and Egyptians. Originally endemic in the Far East, the disease extended to the Mediterranean littoral and later spread over Europe. It is particularly prevalent in Russia, parts of Austro-Hungary, eastern Germany, and along the shores of the Baltic and North Seas, especially in Finland and Holland. In southern Europe, Italy, Greece, and Spain are most affected in the order named.

It has been observed that, generally speaking, trachoma is most prevalent in those countries having an extensive seaboard, and it spreads usually from the littoral to the interior along travel routes. It has been regarded in the United States as an exotic disease, and, although cases were undoubtedly imported from time to time prior to its rigid exclusion under the immigration laws, the disease has not as yet become general in its distribution. While it has been known to exist in some of the large urban centers in the Eastern States, there is evidence that here a decrease has followed local preventive measures, and the systematic exclusion of arriving aliens so afflicted.

Tracoma has been endemic for years in certain restricted areas of southern Illinois and in the mountainous regions of West Virginia and Kentucky. In the latter State an investigation recently conducted by Surg. John McMullen of the United States Public-Health Service showed a prevalence of the disease of 12½ per cent among 3,974 people examined in seven counties. Since these mountain people are among the purest types of Anglo Saxons in the United States and little associated in recent years with arriving immigrants, and since evidences were found of many long-standing cases, it would appear that the period of endemicity of the disease in the section referred to extends over generations.

As will be shown later, the Indians are severely afflicted with the disorder, and among them also it has long prevailed, but the time and manner of its introduction is problematical.

AGE INCIDENCE OF TRACHOMA.

Trachoma is a disease which may be contracted at any age, with the exception that infants are less prone to contract the infection. It has previously been supposed that very young children escape owing to the lack of certain tissue elements in the eyelids which subsequently develop. During the investigations here reported upon, however, a few cases were observed among infants under 1 year of age, which indicates that the infection can occur very early in life, and it is known that it can persist in an active form among the very aged.

THE CAUSE OF TRACHOMA.

The discharges from the trachomatous eye have long been the object of patient bacteriological research, as well as the trachomatous tissue itself. As a result, claims have frequently been made of the finding of a specific organism of infection, but one after another of these claims were refuted.

In 1907, however, Greef and Von Prowachek independently discovered certain small bodies in tissue cells from trachomatous eyes which they supposed bore a causal relation to the disease, and lately Dr. Anna Williams, of the research laboratories of the city of New York, has exhaustively studied an extremely small, hemoglobinophilic bacillus which she isolated from cases of papillary trachoma in which these trachoma bodies or inclusions were present. She concludes that bacillus and inclusion are probably identical in papillary trachoma, and hence that the bacillus is probably the cause of the disease. This announcement, if confirmed, will be of the greatest value in subsequent studies of trachoma and in devising measures for its prevention.

FACTORS CONTRIBUTING TO THE DISSEMINATION OF TRACHOMA.

The medium of contagion is the secretion of the trachomatous eye. The transmission of the contagion may be by direct contact or the infection may adhere to articles of common use such as clothing, bed clothing, handkerchiefs, towels, etc. The walls and floors of dwellings occupied by trachomatous patients and the furniture used by them may presumably become contaminated, assuming such places to be in filthy condition and the persons themselves uncleanly in their habits.

The factors which facilitate the dissemination of trachoma are, therefore, the conditions which prevail wherever human beings are closely crowded together, as in tenement houses, hovels, schools, and insanitary institutions. The careless personal habits and unhygienic conditions characteristic of ignorance and poverty, the use of the common towel and washbasin, and the agency of the fly, create conditions which could obviously favor the spread of trachoma as they would that of any infectious disease.

SYMPTOMS AND COURSE OF TRACHOMA.

The changes in the tissues of the eyelids and eyeball, which take place as the result of trachoma, give rise to many and long-continued symptoms. It is not pertinent here to describe them in detail, but it is necessary to state that they are oftentimes painful, interfere with the patient's bodily comfort, and reduce his working efficiency.

The amount of discomfort depends on the stage of the disease. During the acute onset and at times of exacerbations, there is the usual sensation of a foreign body in the eye. When the cornea becomes involved, and especially when corneal ulcers develop, the pain is intense, the eyes are extremely sensitive to light, and there is spasm of the muscles of the eyelids (photophobia) with profuse discharge of water and, oftentimes, pus.

The disease may continue for years, the membrane of the eyelid gradually becoming destroyed and its place taken by scar tissue. As previously stated also, the cornea of the eyeball eventually becomes involved. Its normal transparent appearance is lost, and a cloudy condition develops which seriously interferes with vision.

THE DANGERS OF TRACHOMA.

Trachoma may be so severe from the outset as to destroy the vision in a few months, or even weeks. As a result of such acute infection, early and deep ulceration of the cornea may ensue, followed by perforation, infection of the interior of the eyeball, and evacuation of its contents.

In untreated trachoma, damage to the cornea at some stage of the disease is the rule. This corneal involvement takes the form of ulceration, keratitis (inflammation of the cornea), and the formation of a condition known as pannus. Pannus consists in the clouding or fogging of the transparent corneal surface, so that it presents a ground-glass appearance. In one form of pannus there is an overgrowth of thick salmon-colored tissue so dense as often completely to obstruct vision.

As scar tissue formation advances in the lids it contracts, thus destroying the lids and causing them to curve in (entropion) with the result that the eyelashes are constantly in contact with the eyeball. The irritation caused thereby brings about inflammation of the cornea, which may be followed by ulceration or thickening so that the cornea may become opaque, or may perforate, and the eye be lost.

Without dwelling upon the truly desperate conditions that may result from trachoma, it is remarkable to what degree even apparently insignificant alteration in the transparency of the cornea may affect vision. Even slight haziness of the cornea, hardly apparent to the naked eye, often sadly obscures the sight.

It is safe to say that 75 per cent of untreated trachoma cases suffer some visual damage, including errors of refraction, by reason of changes caused during some stage of the disease. These ill results may be greatly lessened by treatment, especially in mild cases, but the results are frequently disappointing when the disease is severe. A fundamental fact to bear in mind is that trachoma is more easily

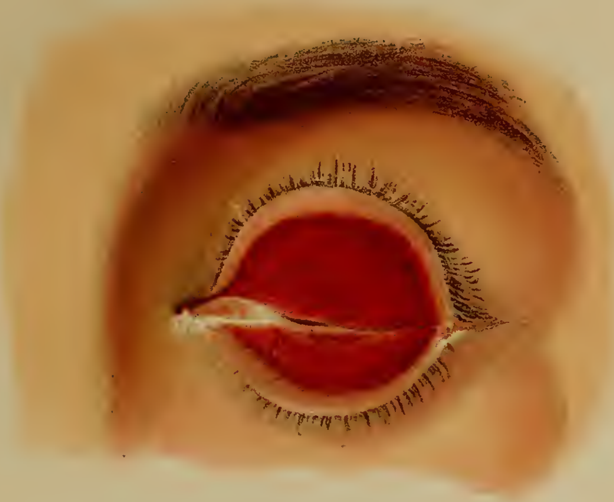

FIG. I.– ACUTE TRACHOMA, WELL DEVELOPED WITH GENERAL DISTRIBUTION OF THE GRANULATIONS IN BOTH THE SUPERIOR AND INFERIOR CUL DE SACS.

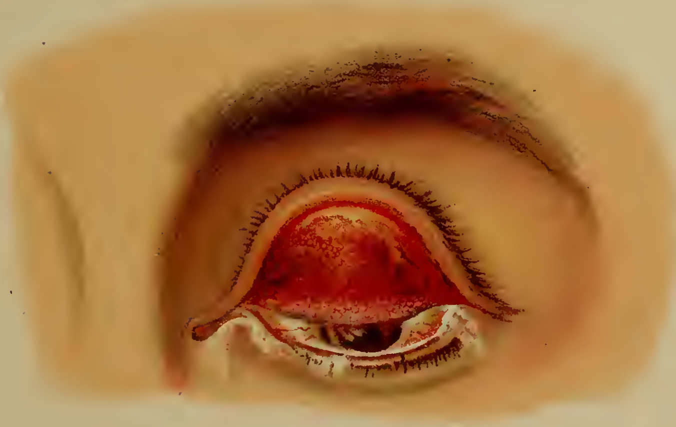

FIG. 2.–TRACHOMA – BEGINNING CICATRIZATION.

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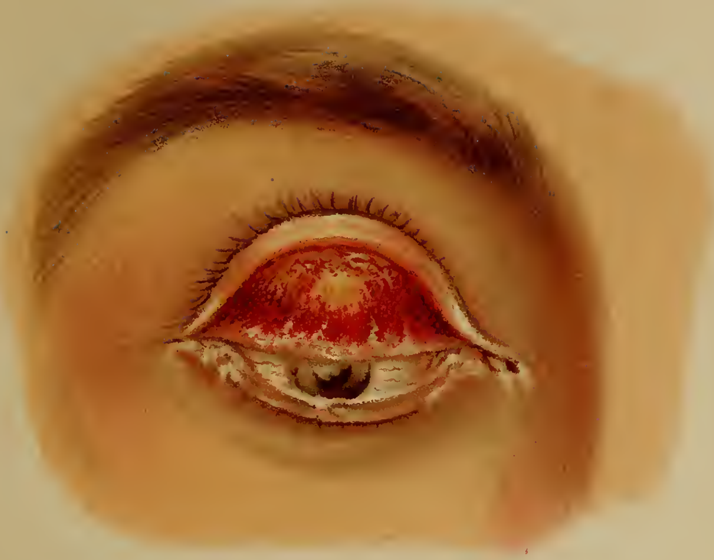

FIG. 3.–TRACHOMA – CICATRIZATION WELL MARKED.

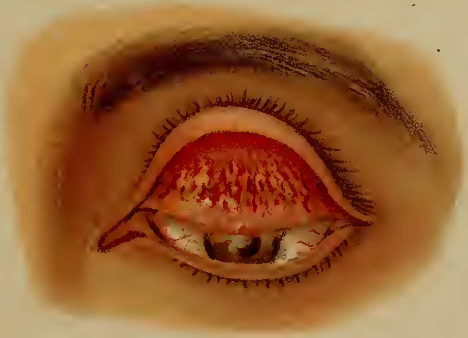

FIG. 4.–TRACHOMA – SHOWING CONNECTIVE TISSUE FORMATION.

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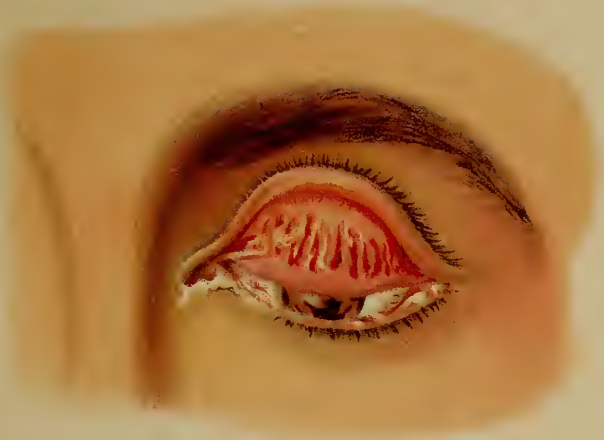

FIG. 5.—TRACHOMA – CICATRIZATION ALMOST COMPLETE.

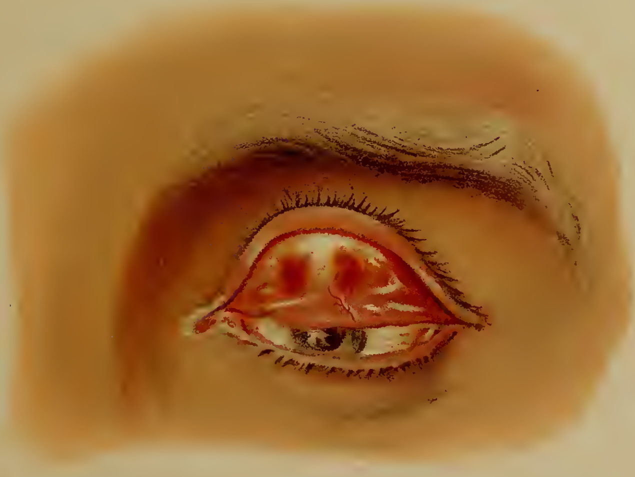

FIG. 6.—TRACHOMA – CURED, MUCOUS MEMBRANE REPLACED BY SCAR TISSUE.

L. H. Wilder, del.

BREUKER & KESSLER CO. PHILA.

preventable than curable, and that the best results are obtained when preventive and curative measures are instituted early.

The effects of trachoma are felt not only by the individual but also by the community in which he lives. The invalidism caused by the disease is liable to impose financial burdens on that community, and the resulting blindness may render its victims public charges.

Finally, school children affected by the disease have their studies interfered with, their education will be more expensive, their power to earn a living will be permanently lessened, and through no fault of theirs they may become permanent charges on the State.

THE PREVALENCE OF TRACHOMA AMONG THE INDIANS.

The occurrence of trachoma among western Indians has occasionally been noted in the medical literature for many years. It seems doubtful whether it has been generally recognized as such, however, by physicians on reservations until recently. In most of the older reservation records examined during this investigation, many cases of eye affections were recorded as "sore eyes," "conjunctivitis," "keratitis," "bad eyes," "scrofulous eyes," or "granulated eyes."

In the records of very recent years increasingly frequent note is made of cases of trachoma as such, and the medical supervisor of the Office of Indian Affairs states that within the past three years concerted action has been taken to provide special curative measures, and their necessity has been emphasized to combat the disease.

All of the officers engaged in these investigations endeavored by examination of records and consultations to secure evidence of the past prevalence of trachoma among the tribes visited, but the results were for the most part unsatisfactory, and reliance was placed on examinations of as large a number of Indians as possible to determine the present prevalence of the disease.

NUMBER OF INDIANS INSPECTED.

There was examined a total of 39,231 Indians at all the reservations and nonreservation boarding schools visited. Of this number, 8,940 individuals, or 22.7 per cent of the entire number examined, were found to have trachoma.

Table No. I gives the location of the 39,231 Indians, the number of cases of trachoma found among those examined at each place, and the percentage of the disease. Accepting 322,715, the figures of the Indian Office, as the total Indian population in the United States, it will be seen that approximately one-eighth of this number were examined. If this rate of infection prevails among the Indians generally, it may be conservatively estimated that there are at the present time a total of 71,997 cases of trachoma among this class of the population.

The persons examined represented both sexes and all ages. Some of them were students in boarding schools, others in day schools and mission schools, and the remainder were reservation Indians. All taken together are considered as representative of the general Indian population on the reservations and in the localities mentioned, with the exception of Oklahoma, to which explanatory reference is made on page 27.

TRACHOMA AMONG ALL INDIANS EXAMINED.

This table, it will be remembered, contains records of all Indians inspected.

TABLE I.—*Trachoma among all Indians examined in the United States.*

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
ARIZONA (COLLECTED BY FRICKS).				
Camp McDowell	Apache	110	13	12
Camp Verde	do	91	34	37
Colorado River	Mojaves and Mojave-Apache	147	51	35
Fort Mojave	Mojaves and Chemehuevi	355	38	11
Gila River	Pimas and Maricopas	943	326	34
Havasupai	Havasupai	169	5	3
Moqui	Hopi	1,079	411	38
Navajo	Navajos	710	213	30
Papago	Papagoes	500	102	20
Phoenix School	Mixed tribes	410	59	14
Salt River	Pimas and Maricopas	112	43	39
San Carlos	Apache	376	49	13
Walapai	Walapais	117	32	27
Western Navajo	Navajos	359	44	12
White River	Apache	395	39	10
Total for State		5,873	1,459	24.9
CALIFORNIA (COLLECTED BY BILLINGS AND HERRING).				
California Missions	Many tribes	559	32	14
Digger Reservation	Digger	11		
Fort Yuma Reservation	Yuma	222	51	7
Round Valley Reservation	Little Lake, Pomo, Kypome, Yuki, Wailaki, etc.	180	13	7.22
Sherman Institute	Many tribes	536	137	25
State Penitentiary (Folsom)	do	14		
State Penitentiary (St. Quentin)	do	14		
Ukiah Day School	Ukiah	19	5	20.53
Total for State		1,555	238	15.3
COLORADO (COLLECTED BY SMITH).				
Navajo Springs	Southern Ute	113	12	10.61
Southern Ute	do	149	29	19.59
Total for State		262	41	15.64
FLORIDA (COLLECTED BY RUCKER).				
Miami	Seminole	22		
IDAHO (COLLECTED BY LLOYD).				
Coeur d'Alene Reservation	Coeur d'Alene	130	14	10.77
Fort Hall Reservation	Shoshone and Bannock	250	48	19.2
Fort Lapwai	Nez Percé	146	22	15.06
Total for State		526	84	15.96
IOWA (COLLECTED BY WHITE).				
Sac and Fox	Pottawatomie and Sac and Fox.	53	17	32.04

TABLE I.—*Trachoma among all Indians examined in the United States*—Continued.

KANSAS (COLLECTED BY HERRING).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Haskell Institute	Many tribes	700	111	15
Kickapoo	Iowa, Kickapoo. and Sac and Fox.	91	44	48.35
Pottawatomie	Pottawatomie	43	21	51
Total for State		834	176	21.1

MICHIGAN (COLLECTED BY CLARK).

Bay Mills	Chippewa	141		
Mackinac	do	204	3	1.47
Mount Pleasant Boarding School	Chippewa, Pottawatomie	298	45	15.10
Total for State		643	48	7.46

MINNESOTA (COLLECTED BY CLARK AND PREBLE).

Fond du lac	Chippewa	182	2	1.09
Grand Portage and Grand Marais	do	143		
Leech Lake	do	598	95	15.88
Mille Lac	do	178	4	2.24
Nett Lake and Pelican Point	do	171		
Pipestone School	do	187	42	22.46
Red Lake	do	640	117	18.28
White Earth	do	1,323	272	20.56
Vermillion Lake	do	120	1	.83
Total for State		3,542	533	15.05

MONTANA (COLLECTED BY WHITE).

Blackfeet	Piegan	435	88	20.23
Crow	Crow	299	87	29.1
Flathead	Flathead	290	36	12.4
Fort Belknap	Gros Ventres, Assiniboine, Arapaho, Sioux.	234	57	24.36
Fort Peck	Sioux	501	158	31.53
Tongue River	Northern Cheyenne	283	111	39.22
Total for State		2,042	537	26.3

NEBRASKA (COLLECTED BY HERRING).

Genoa School		227	98	43
Santee Mission	Sioux	19	9	47
Winnebago and Omaha	Winnebago, Omaha	76	23	33
Total for State		322	130	41

NEVADA (COLLECTED BY BILLINGS AND HERRING).

Carson Boarding School	Digger, Paiute, Shoshone, Washoe.	200	24	12
Fallon School	Paiute, Shoshone	44	17	38.62
Fort McDermitt School	Paiute	100	47	47
Lovelocks School	do	44	16	36.3
Moapa School	do	41	17	41
Pyramid Lake Reservation	do	136	46	33.82
Walker River Reservation	do	101	23	22.77
Western Shoshone Reservation	Paiute, Shoshone	185	39	21.08
Total for State		851	229	26.9

TABLE I.—*Trachoma among all Indians examined in the United States*—Continued.

NEW MEXICO (COLLECTED BY SMITH).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Albuquerque School	Many tribes	339	75	22.12
Jicarilla Agency	Apache	201	17	8.45
Mescalero Agency	do	190	18	9.5
Navajo Agency	Navajo	462	139	30
Pueblo Agencies	Pueblo	845	240	28.4
Zuni Agency	Zuni	170	10	5.88
Total for State		2,207	494	22.38

NEW YORK (COLLECTED BY LEAKE).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Allegheny	Mixed Iroquois	188		
Cattaraugus	do	469	1	0.2
Onandaga	do	73		
Tonawanda	do	91		
Tuscarora	do	122	1	1
Total for State		943	2	.2

NORTH CAROLINA (COLLECTED BY FRICKS).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Cherokee	Cherokee and mixed bloods.	317	23	7

NORTH DAKOTA (COLLECTED BY SCHERESCHEWSKY AND PREBLE).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Bismarck Indian School	Arikaras, Gros Ventres, Mandans, Sioux.	71	19	26.7
Fort Berthold	Arikaras, Gros Ventres, Mandans.	495	148	30.1
Fort Totten	Chippewas, Sioux	369	106	28.7
Standing Rock	Sioux	1,660	405	24.51
Turtle Mountain	Chippewa mixed bloods	744	95	13.04
Wahpeton Indian School	Arikaras, Chippewas, Gros Ventres, Sioux.	108	18	16.6
Total for State		3,447	791	22.94

OKLAHOMA (COLLECTED BY GUTHRIE).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Five Civilized Tribes	Creek	367	243	66.21
Do	Cherokee	87	64	73.56
Do	Choctaw	509	364	71.31
Do	Chickasaw	122	90	73.76
Do	Seminole	92	79	85.86
Kiowa and Comanche	Kiowa, Comanche, Wichita, Caddo, Apache.	454	393	86.78
Cheyenne and Arapaho	Cheyenne, Arapaho	305	227	74.42
Shawnee	Pottawatomie, Shawnee, Kickapoo, etc.	194	69	35.56
Sac and Fox	Sac and Fox	73	51	70.00
Pawnee	Pawnee	151	103	68.21
Ponca	Ponca	132	84	63.63
Otoe and Missouri	Otoe and Iowa	54	39	72.22
Chilocco Nonreservation School		509	334	65.61
Osage	Osage	93	47	50.53
Seneca	Wyandotte, Seneca (allied)	110	48	43.63
Total for State		3,252	2,235	68.72

OREGON (COLLECTED BY BILLINGS).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Klamath Lake Reservation	Klamath, Modoc	143	13	9.09
Salem School	Mixed tribes	316	29	9.1
Siletz Reservation	do	114	19	16.6
Umatilla Reservation	Cayuse, Nez Percé, Umatilla, Walla Walla.	150	13	8.66
Warm Springs Reservation	Paiute, Warm Spring, Wasco	181	20	11.05
Total for State		904	94	10.4

TABLE I.—*Trachoma among all Indians examined in the United States*—Continued.

PENNSYLVANIA (COLLECTED BY CLARK).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Carlisle Indian School	Mixed tribes	552	76	13.76

SOUTH DAKOTA (COLLECTED BY SCHERESCHEWSKY AND PREBLE).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Canton Insane Asylum	Many	54	8	14.81
Cheyenne River Reservation	Sioux	520	117	22.50
Crow Creek Reservation	do	510	143	28.04
Flandreau School	Mixed	350	68	19.43
Lower Brulé Reservation	Sioux	233	58	24.89
Pierre School	Mixed	164	57	34.76
Pine Ridge Reservation	Sioux	2,006	263	13.11
Rapid City School	do	236	40	17.00
Rosebud Reservation	do	1,404	141	10.00
Sisseton School	do	177	43	24.29
Springfield School	do	64	18	28.00
Yankton Reservation	do	403	103	25.56
Total for State		6,121	1,059	17.24

UTAH (COLLECTED BY HERRING).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Uintah and Ouray School and Reservation.	Ute	182	75	39.00

VIRGINIA (COLLECTED BY CUMMING).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Hampton Normal Institute	Many	43	13	30.2

WASHINGTON (COLLECTED BY LLOYD).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Colville and Spokane Reservation	Spokane	351	71	20.22
Cushman Boarding School	Chehalis, Nisqually, Puyallup, Quinaielt, Snohomish, Squaxon.	307	11	3.65
Lummi Reservation	Dwamish and Allied Tribes.	92	10	10.16
Suquamish Reservation	do	74	6	8.1
Swinomish Reservation	do	49	11	21.28
Tulalip Reservation	do	168	6	3.57
Yakima Reservation	Yakima	306	65	21.24
Total for State		1,347	180	13.35

WISCONSIN (COLLECTED BY CLARK).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Lac Courte, Oreille, and Haywood School	Chippewa	470	23	4.89
Lac du Flambeau	do	249	51	20.48
La Pointe	do	466	4	.85
Oneida	Oneida	366	16	4.28
Menominee	Menominee	730	65	9.02
Red Cliff	Chippewa	238	1	.42
Stockbridge School	Stockbridge	120	3	2.50
Tomah School	Many	237	16	6.74
Wittenberg School	do	123	28	22.76
Total for State		2,999	207	6.86

WYOMING (COLLECTED BY HERRING).

School or reservation.	Tribe.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Shoshone Agency	Shoshone and Arapaho	392	199	51.00
Grand total		39,231	8,940	22.7

From an examination of the foregoing table it is evident that the incidence of trachoma varies much among Indians in different sections of the country and even in different parts of the same reservation. For instance, in Oklahoma, among 3,252 Indians examined, 2,237, or 68.7 per cent, had trachoma. In New York, on the other hand, out of 943 Indians examined, only 2, or 0.2 per cent, had the disease, and these two probably contracted the infection at a nonreservation boarding school. On the Navajo Reservation likewise Fricks reported the finding of trachoma in 30 per cent of those examined around Fort Defiance and along the Santa Fe Railroad, while 150 miles in the interior of the reservation it ran below 10 per cent.

The accompanying Chart I shows in graphic form the percentages of trachoma found among those examined in the several States and the comparative incidence of infection. Broadly speaking, it would be possible to place these States in groups representing geographic areas, as the Atlantic slope, the Missouri River watershed, the Southwestern Plateau, the Pacific slope, etc. It must be remembered, however, that the habits of the Indians, their degree of sanitation, their exposure to poverty, and not climate, soil, or altitude, are the important factors in determining the prevalence of trachoma.

Arizona.—Fricks reports that of 5,873 Indians examined 24.9 per cent were found to have trachoma. The more isolated tribes, however, like the White River Apaches, two days' travel from the outside world, and the Havasupais, at the bottom of the Cataract Canyon, showed very slight infection—2 and 2.5 per cent, respectively. Eight cases of trachoma were seen by him among the white employees and their children at different schools, presumably contracted from Indians.

During the past year the public schools of Bisbee, Ariz., were closed because of an outbreak of trachoma, which resulted thenceforth in trachoma cases being excluded from the school. The disease was reported as common among the Mexican school children in and around Phoenix, a section having a large Indian population. For purposes of comparison Fricks examined three public schools for white children. In one school of 30 pupils no trachoma was found, in one of 27 pupils no trachoma, and in one of 30 three cases were found, one being an American and two Mexicans. In the same vicinity three Indian schools showed 54, 36, and 41 per cent, respectively, of trachoma cases. Finally, he states that "the trachoma situation among the Arizona Indians is extremely grave because of the enormous infection among them and its rapid spread from year to year, and because the tribes with the highest infections are in closest contact with the whites, the Hopis being the only exception."

California.—The percentage of trachoma (15.3 per cent) among the Indians in California was found to be somewhat less than the average found among all Indians examined throughout the country. An explanation for this may be the isolation of their dwellings, the fact that they live in small groups, and the natural barrier to extensive migration furnished by the mountain chains to the eastward.

Among the Utes in Colorado the prevalence of the disease was practically the same as among the California Indians examined. In Florida no cases were found, but this may be due to the small

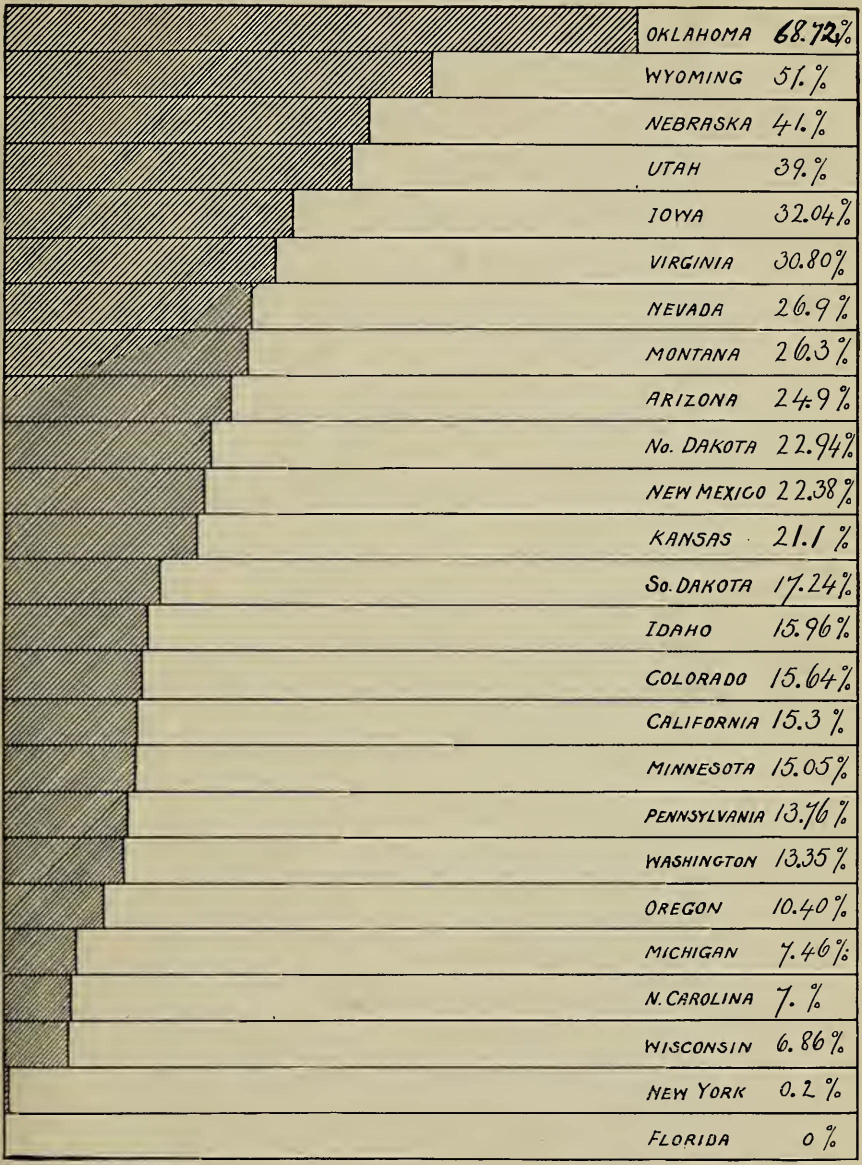

CHART SHOWING THE PERCENTAGE OF INDIANS SUFFERING FROM TRACHOMA AMONG THOSE EXAMINED IN THE DIFFERENT STATES.

number examined, the habits of the Seminoles in that State rendering them very inaccessible, since they spend practically all of their time deep in the Everglades.

Idaho.—In Idaho the percentage of prevalence among those Indians examined was 15.96 per cent, which is about that for California. In fact, the Pacific Coast States might be placed in one group from the standpoint of trachoma prevalence, but this must be considered high when it is remembered that Boldt, an authority on the disease, regards 16 cases per 1,000 population as a heavy infection in a community.

In Iowa, Kansas, and Nebraska the Indian population is small, and while the percentages of trachoma among those examined are high, being 32.04, 21.1, and 41 per cent, respectively, these percentages in the last two States are increased because they are based largely upon examinations of nonreservation schools, the students of which come from a number of other States, and because in such schools the chances of transmission of infection are greater than in isolated families.

While engaged in examining Indian children in Kansas it was found by Herring that a number were in attendance at public schools attended by white children. He inspected two such schools near the Sac and Fox Reservation. In one where 17 white children were examined 3 cases of very active trachoma were found, and in another where 4 children were examined 2 active cases were found.

In Michigan also the Indian population is small and the largest amount of trachoma seen by Clark was in the Mount Pleasant nonreservation boarding school.

Minnesota.—Among the 3,542 Indians examined in Minnesota 533 cases of trachoma were found—a percentage of 15.05. The percentage of trachoma is represented by Dr. Clark to be higher in some sections of the State than in others, and to vary in different parts of the same reservation. In respect to this varying distribution he states as follows:

> The whole of the northeastern section of Minnesota, embracing the Lake Superior watershed, is free from trachoma. This area includes Grand Portage, Grand Marais, Vermilion Lake, and Nett Lake. One case of trachoma was found in the Vermilion Lake Boarding School, a recent recruit from Lake Winnibigoshish region. These Indians have but little communication with the Indians of other parts of the State, and their freedom from trachoma can only be explained on the ground of lack of exposure.
>
> The highest percentage of trachoma was found on the White Earth Reservation. In the examination of 1,323 Indians on this reservation 272 cases of trachoma were found, a percentage of 20.56.
>
> A peculiarly heavy trachomatous infection exists at Pine Point, White Earth Reservation. In a house-to-house canvas 147 people were examined, finding 53 cases of trachoma, 36.05 per cent.
>
> Only two cases of trachoma were found among the Indians of Fond du Lac Reservation, a percentage of 1.24 examined. These Indians are in close contact with civilization. They are better housed than are the Indians of other sections of Minnesota and with whom they have little association.
>
> A striking parallel can therefore be drawn from these figures regarding the influences favoring the spread of trachoma among the Indians of Minnesota. Wherever the primitive Indian is found in contact with civilization, childlike in his conception of responsibility, accepting the vices of the white man but eschewing the good things, there the heaviest trachoma infection has been found. On the other hand, the more nearly he approaches the surrounding white population in manner of living, as in the case of the Indians of the Fond du Lac Reservation, there little trachoma is found.

In a previous investigation of the prevalence of trachoma among Indians at the White Earth and Leech Lake Reservations made in May, 1912, Clark found that out of a total of 545 Indians examined, 253, or 46.1 per cent, had the disease. This large percentage, however, was due to the fact that 115 Indians who were assembled from the surrounding country for treatment were included in the enumeration with children of boarding schools at which the examinations were made.

Montana.—Out of a total of 2,042 Indians examined in Montana, White found 537 cases, or 26.3 per cent, of trachoma. He concludes that the disease is astonishingly prevalent, that it affects the young, the middle-aged and the old, and that its worst effects are seen among the latter.

Nevada.—Notwithstanding the Indian reservations visited in Nevada are remote and the Indians brought in little contact with white men, they showed a high degree of prevalence. This may be due, however, to their association with highly infected tribes farther south in the recent or remote past and to their primitive habits and insanitary surroundings once the infection was introduced among them.

New Mexico.—Out of 2,207 Indians examined in New Mexico, 494, or 22.38 per cent, were found to be suffering with trachoma. At the Jicarilla Agency the percentage of those examined (201) having trachoma was 8.45; but Dr. Smith expresses the belief that the disease is more prevalent than this figure would indicate, since here the incidence among the school children examined is considered more nearly representative of the population as a whole.

Among 462 Indians examined on the Navajo Reservation in New Mexico, 139, or 30 per cent, were found to have trachoma. This is the same per cent of trachoma found among the Navajos examined by Fricks in Arizona. In reporting on this condition Dr. Smith states as follows:

> The most remarkable thing in this investigation was the high percentage of trachoma found. It would appear from this that the agency physician's estimate of 2,000 cases among his 8,000 Indians is not too high. The rate was high in all school children examined, but was also high among those of the same age not in school. The tendency of trachoma to run in families seemed more marked here (than elsewhere), but this could not be determined accurately because not many children of the same family were present in school.

Among the Zuni Indians, only 5.88 per cent of 170 examined had trachoma. Dr. Smith expresses the belief, therefore, that trachoma is comparatively rare among these Indians. On the other hand, he states that the disease is very frequent among the Pueblo Indians and that the results are unusually serious.

North Carolina.—At the Cherokee Reservation Fricks found 7 per cent of the 317 Indians examined to be infected with trachoma. They are citizens of North Carolina, and he states that they live just as do the poorer white mountaineers of that section, but attend Indian schools.

North and South Dakota.—Trachoma was found to be very prevalent among the Indians of North and South Dakota. The most heavily infected area was found in the north and northwestern part of North Dakota. Dr. Schereschewsky reported the highest percentage of the disease in these States at the Fort Berthold Reservation,

N. Dak., where 30.1 per cent of the Indians examined were found infected. The lowest percentage in these States was found by him on the Rosebud Reservation where 10 per cent of those examined were afflicted with the disorder.

In South Dakota out of 6,121 Indians examined, 1,059 or 17.24 per cent were found afflicted with trachoma. These cases ranged from mild involvement to the severest possible types of the disease and total blindness.

Oklahoma.—In Oklahoma Dr. Guthrie examined 3,252 Indians and found 2,235, or 68.72 per cent, suffering from trachoma. It is needless to state, however, that practically all of these were students at schools. On account of their being widely scattered on land allotments and because of opposition on the part of many, he found it impracticable to examine as relatively a large number of adults as children.

In other States the prevalence of trachoma in schools has been found generally to be somewhat greater than among reservation Indians not in schools. It is believed, therefore, that the percentage of the disease among the Indian population of Oklahoma as a whole is not as high as the figures presented would indicate.

Guthrie collected data regarding the degree of blood in 2,857 of the Indians examined by him and compiled the following table:

TABLE II.—*Percentage of trachoma, according to degree of Indian blood, among 2,857 Indians examined in Oklahoma.*

Degree of blood.	Number examined.	With trachoma.	Percentage of trachoma.
Full blood	1,834	1,460	79.60
Between half and full	630	389	61.74
Less than half	393	206	52.41

From these results Guthrie concludes that Indians of full blood in Oklahoma sustain a much heavier infection than do mixed bloods, and, since much the larger proportion of school children examined by him were full bloods, he considers this also an important factor in explaining the high percentage of trachoma found by him.

During his investigations Dr. Guthrie reported the finding of trachoma among negro school children as follows:

> An examination was made of 79 Negro pupils at the Tullahassee Boarding School. These children are the descendants of the Creek freedmen. I was informed that very few of them are of Indian blood and I gained the impression that their association with the Indian population was not more intimate than that among the whites and Indians. It is interesting to know that over 60 per cent of these Negro pupils were suffering from trachoma.

This observation is of importance on account of the mixed population in Oklahoma and because of the current belief that the Negro is immune to trachoma.

Oregon.—In Oregon, out of 904 Indians examined, 94 or 10.4 per cent had trachoma. This State thus had the smallest percentage of trachoma cases of any of the Pacific Coast States.

Pennsylvania.—All of the Indians examined in Pennsylvania were students of the Carlisle School. They numbered 552 and there was found among them 76 cases of trachoma or 13.76 per cent. Many tribes are represented among the students of this institution.

Its influence in the transmission or control of trachoma as well as other diseases may accordingly become great.

Virginia.—All of the Indians seen in Virginia were inmates of the Hampton Normal School. There were 43 in all, 13 of whom had trachoma. This institution, like the Carlisle School, has representation from a large number of tribes and localities. Cumming states that all of the trachoma had been treated, surgically or otherwise, none was in an acute active stage, and 2 cases were after the examination sent to an opthalmologist and operated upon.

Wisconsin.—Out of a total of 2,999 Indians examined in Wisconsin, 207, or 6.86 per cent, were found to have trachoma. Clark refers to prevalence in the State as follows:

> The Indians of Wisconsin have long been in contact with civilization and are increasingly inclined to partake of its benefits. The houses of the Indians in Wisconsin are well built for the most part and furnished, comparing favorably with the houses of white people in like circumstances.
>
> An exception to the rule is the Lac Du Flambeau, with a trachoma percentage of 10.38, against 6.86 for the State at large. These Indians are the most primitive of any examined in Wisconsin.

Washington.—Among 1,347 Indians examined in the State of Washington, 180 or 13.35 per cent had trachoma. The highest percentages of infection were found at the Colville and Spokane, Swinnomish and Yakima Reservations.

Wyoming.—Out of a total of 392 Indians examined at the Shoshone Reservation, 199 had trachoma—a percentage of 57. On this reservation live parts of two different tribes, the Shoshones and the Arapahoes. Herring states that the latter represent about one-third of the original tribes of Arapahoes found in the United States, the remainder of this tribe being now domiciled in Oklahoma.

He states that the Shoshones and Arapahoes are apparently different in every respect, the former being considered quiet, fairly industrious, more advanced toward self-support, and certainly more advanced in their personal and domestic habits; the latter being indolent, dirty to an extreme, regarding their persons, homes and habits generally, and very indifferent to any medical or other aid offered them.

Herring further reports that the Arapahoes showed a very much higher percentage of trachoma than did the Shoshones, and a distinctly higher percentage of grave complications as a result of the disease. He invites attention to the interesting fact that the members of this tribe domiciled in Oklahoma showed a like high percentage of infection of trachoma.

Finally, out of the total 39,231 Indians examined in all parts of the country, it was found that 22.7 per cent of them were suffering from trachoma—a remarkable and deplorable condition from both public health and economic standpoints.

PREVALENCE OF TRACHOMA IN INDIAN BOARDING SCHOOLS.

The general prevalence of trachoma among all Indians examined having been dealt with, it becomes necessary to consider its prevalence in boarding schools, since these are very generally regarded as one of the most important factors for the advancement of the Indian in the general scheme of supervision devised for his benefit by the Federal Government.

There is well-grounded basis for this belief, for, at no time in his life, is the Indian more amenable to civilizing influences than during his stay at a boarding school, nor, by reason of the very complete control which may be exercised in such institutions over his habits, environment and daily life, is any better opportunity afforded for educating him in the principles of hygiene and home sanitation, and in ingraining these principles into his character so as to insure their practical application upon his return to his reservation and tribe.

The impairment of vision frequently resulting from trachoma constitutes such a menace to his physical and mental efficiency, and the opportunities for its propagation in schools are so numerous and favorable, that it became necessary to examine very carefully into the incidence of this disease in Indian boarding schools.

During the investigations, 133 boarding schools were visited by the several officers engaged in the work and 16,470 pupils examined. Although this number has been included in the total number contained in Table I, it is pertinent to consider them separately, and the following Table III shows by States the names of schools visited, the number inspected, the number of cases of trachoma, and the percentage of the disease in each.

TABLE III.—*Trachoma in Indian boarding schools.*

State.	Boarding school.	Number of pupils examined.	Number of cases of trachoma.	Per cent of trachoma.
				Per cent.
Arizona (collected by Fricks)	Chin Lee	76	38	50
	Colorado River	49	20	41
	Fort Apache	200	28	14
	Fort Defiance	155	18	12
	Fort Mojave	244	69	28
	Kearn's Cañon	100	29	29
	Leupp	67	15	24
	Phoenix	410	59	14
	Sacaton Mission	200	55	27
	San Carlos	100	11	11
	St. John's Mission	203	92	45
	St. Michael's Mission	121	21	17
	Truxton Cañon	72	26	36
	Tuba	87	9	10
	Tucson	140	25	18
Total for State		2,242	515	25.85
California (collected by Herring)	Fort Yuma	93	17	18
	Sherman Institute	536	137	25
	St. Boniface Mission	100	24	24
Total for State		729	178	24.41
Idaho (collected by Lloyd)	Fort Hall	107	22	20.65
	Fort Hall Mission	18	4	22.22
	Fort Lapwai Sanitarium	65	5	7.69
	Cœur d'Alene Mission	28	3	10.7
Total for State		218	34	15.6
Kansas (collected by Herring)	Haskell Institute	700	111	15.7
	Kickapoo	66	37	56
Total for State		766	148	19.32
Michigan (collected by Clark)	Mount Pleasant	298	45	15.10
Total for State		298	45	15.10

TABLE III.—*Trachoma in Indian boarding schools*—Continued.

State.	Boarding school.	Number of pupils examined.	Number of cases of trachoma.	Per cent of trachoma.
				Per cent.
Minnesota (collected by Clark and Preble.)	Cass Lake	47	18	38.29
	Cross Lake	46	12	26.08
	Leech Lake	64	12	18.75
	Pipe Stone	187	42	22.46
	Red Lake	63	19	30.15
	St. Benedict's Industrial Mission	94	12	12.75
	St. Mary's Mission	64	20	31.25
	Vermillion Lake	84	1	1.1
	White Earth	130	42	32.30
	Wild Rice River	54	15	27.77
Total for State		833	193	23.16
Montana (collected by White)	Busby	74	27	36.48
	Crow	49	15	28.57
	Cut Bank	74	11	14.86
	Harlem	20	3	15
	Holy Family Mission	75	17	22.66
	Poplar River	94	22	23.4
	St. Ignatius Mission	172	17	9.88
	St. Labres Mission	22	13	59
	St. Paul Mission	74	18	24.32
	St. Xavier Mission	38	21	55.26
	Wolf Point	48	24	50
Total for State		740	188	25.27
Nebraska (collected by Herring).	Genoa	227	98	43
	St. Augustine Mission	43	11	25
	Santee Mission	19	9	47
Total for State		289	118	40.83
Nevada (collected by Billings)	Carson	200	24	12
Total for State		200	24	12
New Mexico (collected by Smith)	Albuquerque	339	75	22.12
	Presbyterian Mission	31	26	83.87
	San Juan	148	32	21.62
	St. Catherine's Mission	210	44	20.54
Total for State		728	177	24.31
New York (collected by Leake)	Friend's	48	....	....
	Thomas	78	....	....
Total for State		126	....	....
North Carolina (collected by Fricks).	Cherokee	141	11	8
Total for State		141	11	8
North Dakota (collected by Schereschewsky and Preble).	Bismarck	71	19	26.7
	Fort Berthold Mission	57	27	47.37
	Fort Totten	168	33	19.6
	Fort Totten Mission	83	26	31.32
	Home Mission	12	4	33.3
	Martin Kenel Agricultural	98	33	33.67
	Standing Rock	164	23	14
	St. Elizabeth's Mission	39	24	61.54
	Wahpeton	108	18	16.6
Total for State		800	207	25.87
Oklahoma (collected by Guthrie).	Anadarko (Mission)	112	97	86.60
	Armstrong Academy	109	86	78.89
	Bloomfield	75	57	76
	Cantonment	74	64	86.48
	Cheyenne and Arapahoe	140	98	70
	Collins Institute	47	33	70.21
	Chilocco	509	334	65.61
	Cherokee Orphanage	65	51	78.46
	Euchee	122	100	81.96
	Eufaula	87	28	32.18
	Fort Sill	152	122	80.26
	Jones Academy	101	61	60.39
	Mekusukey	92	79	85.86
	Nuyaka	79	66	83.54

TABLE III.—*Trachoma in Indian boarding schools*—Continued.

State.	Boarding school.	Number of pupils examined.	Number of cases of trachoma.	Per cent of trachoma.
				Per cent.
Oklahoma (collected by Guthrie).	Old Goodland (Mission)	77	65	84.41
	Osage	73	37	50.68
	Otoe and Missouria	54	39	72.22
	Pawnee	95	72	75.78
	Ponca	98	63	64.28
	Rainey Mountain	114	105	92.10
	Riverside	76	69	90.78
	Sac and Fox	73	51	70.00
	Sacred Heart (Mission)	36	13	36.11
	Seger	68	47	69.11
	Seneca	110	48	43.63
	Shawnee	84	32	38.09
	St. Mary's (Mission)	73	23	31.50
	Wheelock	85	53	62.35
	Tullahassee	79	49	62.02
	Tuskahoma	110	80	72.72
Total for State		3,069	2,122	69.14
Oregon (collected by Billings)	Salem	316	29	9.1
Total for State		316	29	9.1
Pennsylvania (collected by Clark)	Carlisle	552	76	13.76
Total for State		552	76	13.76
South Dakota (collected by Schereschewsky and Preble).	Cheyenne River	156	39	25
	Crow Creek	81	25	30.88
	Flandreau	350	68	19.43
	Holy Rosary Mission	205	37	18
	Immaculate Conception Mission	48	28	58.33
	Lower Brulé	71	30	42.25
	Pierre	163	57	34.97
	Pine Ridge	213	20	9.39
	Rapid City	236	40	16.9
	Rosebud	142	18	12.67
	St. Francis Mission	270	21	7.9
	St. Mary's Mission	73	12	16.44
	Sisseton	160	43	26.87
	Yankton	72	28	38.89
Total for State		2,240	466	20.8
Utah (collected by Herring)	Uintah and Ouray	47	19	40
Total for State		47	19	40
Virginia (collected by Cumming).	Hampton	43	13	30.2
Total for State		43	13	30.2
Washington (collected by Lloyd).	Colville Mission	31	21	67.74
	Cushman	307	11	3.56
	Fort Lapwai	65	5	7.7
	St. Mary's Mission	74	24	32.43
	Yakima	121	24	19.83
Total for State		598	85	14.21
Wisconsin (collected by Clark)	Hayward	175	13	7.47
	Holy Family Mission	65	0	0
	Keshena	65	18	27.64
	Lac du Flambeau	95	35	36.84
	Lutheran Mission	45	1	2.22
	Oneida	149	10	6.71
	St. Joseph's Industrial	148	15	10.13
	St. Mary's Mission	194	1	.51
	Tomah	237	16	6.78
	Wittenberg	123	28	22.76
Total for State		1,296	137	10.57
Wyoming (collected by Herring).	Episcopal Mission	13	10	76
	Shoshone	108	57	53
	St. Stephen's Mission	96	64	65
Total for State		217	131	60.36
Grand total	133 schools	16,470	4,916	29.86

On inspection of the above table it will be seen that 16,470 pupils in Indian boarding schools were examined for trachoma and 4,916 cases of this disease found, or a general percentage of 29.86. The highest percentage found was reported by Guthrie at the Rainey Mountain School in Oklahoma where, out of 114 pupils examined, no less than 105, or 92.10 per cent, were found to be suffering from this affection. Only 3 schools contained in the list were found free from trachoma, the Holy Family Mission School, in Wisconsin, and the Friend's Indian and the Thomas Indian schools, in New York. The absence of trachoma infection in these schools is accounted for by the fact that no trachoma was found in the Indian population from which the inmates of these schools are drawn.

Classifying these schools according to the percentages of trachoma found among the pupils, it will be seen, in the case of the 133 schools tabulated, that in 2 schools over 90 per cent of the pupils were found to be trachomatous, in 8 from 80 to 90 per cent, in 10 from 70 to 80 per cent, in 9 from 60 to 70 per cent, in 8 from 50 to 60 per cent, in 8 from 40 to 50 per cent, in 7 from 35 to 40 per cent, in 12 from 30 to 35 per cent, in 14 from 25 to 30 per cent, in 10 from 20 to 25 per cent, in 17 from 15 to 20 per cent, in 11 from 10 to 15 per cent, in 10 from 5 to 10 per cent, in 4 from 0.5 to 5 per cent, and in 3 schools only was no trachoma found. In 88 schools, or approximately 66 per cent of the total number examined, 20 per cent or more of the pupils examined were found to be suffering from trachoma.

Arizona.—Fricks reports the examination of 15 Indian boarding schools in this State, with a total of 2,224 pupils. He found 515 cases of trachoma, or a percentage of 25.85. The greatest amount of infection found was at the Chinn Lee Boarding School, where 50 per cent of the pupils were stated to be trachomatous, as contrasting with the rate of 30 per cent found to prevail for the surrounding reservation Indians. He reports that the pupils at this school have had no medical supervision for the past year. The next highest rate was found at the St. Johns Mission School, which he states to be poorly lighted, without medical attention, and the common towel in use in the wash rooms. While the general trachoma rate in the Arizona boarding schools was found to be 28.85 per cent, Fricks found a rate of only 19 per cent in the reservation Indians examined, exclusive of school children.

California.—Three boarding schools, with a total of 729 pupils, were examined by Herring in this State. One hundred and seventy-eight cases of trachoma were found, a percentage of 24.41. This is considerably in excess of the general percentage (15.3 per cent) noted for the State. Herring calls attention to the fact that in the large Sherman Institute 133 pupils were members of the mission tribes in southern California, where trachoma is infrequently met with.

Nevertheless, 25 cases of trachoma were found in this group of pupils. Herring believes this to be a convincing proof of the ease with which trachoma may be disseminated through the agency of schools, as it was evident that many of these children did not acquire the infection at their homes. Such infected pupils, however, may well be the means of introducing the disease into territory uninfected at present, upon returning to their families.

Idaho.—Five boarding schools were examined by Lloyd, with trachoma percentages running from 22.22 at the Fort Hall Mission

School down to 7.69 per cent at the Fort Lapwai Sanitarium School. Thirty-four cases of trachoma were found in the 218 pupils examined, a percentage of 15.6, which is slightly less than the general percentage of 15.96 per cent found in the State. Dr. Lloyd states that the Sanitarium School at Fort Lapwai is a very creditably conducted institution, a fact which may account for the low percentage of trachoma present.

Kansas and Nebraska.—These States are considered together, on account of the small number of Indians resident in this section of the country. Herring examined five schools in the two States, including two large nonreservation schools, viz, the Haskell Institute, at Lawrence, Kans., and the Genoa Boarding School, in Nebraska. Percentages of 15 and 48 per cent of trachoma, respectively, were found in the pupils of these two institutions. As in the case of the Sherman Institute in California, pupils from a large number of reservations are present, thus emphasizing the possibility of the spread of trachoma from one reservation to another through the agency of returning pupils, even where such reservations are geographically far apart.

Michigan, Minnesota, and Wisconsin.—The boarding schools in these States are considered together by reason of their contiguity. In Michigan, Clark examined one large school, the Hayward, with the result that 15.10 per cent of the pupils were trachomatous. This is double the rate of 7.46 per cent computed for the total number of Indians examined in the State. A number of the pupils with trachoma were Chippewas from Mackinac, where the percentage of trachoma among the Indian population is relatively low (1.47 per cent). The inference is strong, therefore, that the disease was contracted at the school, and the return of such pupils to their homes may be expected further to disseminate an infection which is at present but slight.

Minnesota.—Ten boarding schools were inspected in this State, 9 by Clark and 1 by Preble. Eight hundred and thirty-three pupils were examined and 193 cases of trachoma found, or a percentage of 23.16. This is again far in excess of the general percentage of 15.05 found for the State. The percentages ran from 42 per cent at the White Earth School down to 1.2 per cent at the Vermilion Lake School. The low percentage prevalent at this school is explained by Clark as due to the very low percentage found among the Indians from which this school is recruited.

Wisconsin.—Ten schools were examined by Clark in this State with 1,296 pupils and 137 cases of trachoma, or a percentage of 10.57. This is again nearly double the general trachoma percentage found prevalent in the State. In one school (Holy Family Mission), no case of trachoma was found, while in the St. Mary's Mission School but 1 case, out of 194 pupils, was detected. These low percentages are again due to the absence of trachoma among the Indians in those parts of the State from which the pupils at these schools are recruited.

Discussing the prevalence of trachoma in the schools of these three States, Clark writes as follows:

> The highest percentage of trachoma among school children is found in the boarding schools of heavily infected reservations. It is found that the percentage of trachoma in boarding schools is invariably in excess of that in the reservations in which they are situated.

A still more significant fact, from an epidemiological standpoint, is the higher percentage of trachoma in the nonreservation boarding schools than the percentage for the State in which they are situated. Only one explanation is possible for this condition, the intimate personal contact and daily association of the healthy with the diseased in schools must, of necessity, result in an increased number of cases of trachoma in such schools. The ominous portent of such a condition is the possible spread, through children thus infected, of trachoma in Indian populations not infected or only slightly so.

Montana.—Eleven Indian boarding schools in this State were examined by White. One hundred and eighty-eight cases of trachoma were found among the 740 pupils examined, or a percentage of 25.27. The highest percentage encountered was at the St. Labres Mission School on the Tongue River Reservation, where 59 per cent of the pupils were found infected, while at the St. Ignatius Mission School on the Flathead Reservation only 17, or 9.88 per cent out of the 172 pupils were infected.

Nevada.—At the Carson School, Billings found a trachoma infection of 12 per cent. This is considerably below the percentage of trachoma found on the reservations of the State, which ranged between 21 and 47 per cent, and forms an exception to the generally greater prevalence of trachoma in boarding schools than on reservations.

New Mexico.—Four boarding schools in this State, with a total of 728 pupils and 177 cases of trachoma, were inspected by Smith. The extraordinarily high percentage of 83.87 was encountered in one school, the Presbyterian Mission School. The general prevalence of trachoma for all the boarding schools is 24.31 per cent, slightly in excess of the percentage of 22.38 per cent computed for the State.

New York.—Two boarding schools with a total of 126 pupils were examined within this State by Leake. No case of trachoma was found, a circumstance well explained by the fact that only in two instances was trachoma present in 943 New York Indians examined. As has already been pointed out, these Indians contracted the infection at a nonreservation boarding school in another State.

North Carolina.—At the Cherokee Boarding School examined by Fricks, 11 cases of trachoma, or 8 per cent, were found among the 141 pupils examined.

North and South Dakota.—These States are considered together owing to contiguity and general similarity in climate and character of Indian population. Twenty-three boarding schools in the two States were visited by Schereschewsky, Herring, and Preble. A total of 800 and 2,240 pupils were examined in North and South Dakota, respectively, with the result of finding 207 cases of trachoma in the former State and 466 cases in the latter, giving percentages of 25.87 and 20.8 per cent. These percentages, as usual, are in excess of the general percentages computed for these States as a whole, the latter being 22.94 and 17.24 per cent, respectively. The highest percentage found was by Preble at the St. Elizabeth's Mission School at Wakpala, S. Dak., while the lowest was reported by Schereschewsky at the St. Francis Mission School on the Rosebud Reservation, where only 21 pupils out of 270, or 7.9 per cent, were found suffering from this disorder. Schereschewsky points out that trachoma had been vigorously treated at this institution the previous year, which accounts in part at least, for the low incidence of the disease at this school.

Oklahoma.—The prevalence of trachoma in the boarding schools of Oklahoma is so great that it merits special attention. Guthrie reports that he visited 30 schools, inspected 3,069 pupils and found 2,122 cases of trachoma, or 69.14 per cent. In some schools nearly all the pupils were infected with the disease. As the Oklahoma Indians are in rapid process of assimilation with the general population, the prevalence of trachoma among them to such considerable extent constitutes a serious menace to the future general population of that State.

Pennsylvania.—Five hundred and fifty-two pupils at the well-known Indian school at Carlisle were examined by Clark and 76 cases of trachoma found, a percentage of 13.76. As has already been pointed out, the presence of trachoma at this institution, with its wide tribal representation, is of great moment. An instance has already been cited of pupils, coming from noninfected regions, who contracted trachoma during their stay at a nonreservation boarding school.

Washington and Oregon.—Three schools examined by Billings and Lloyd are tabulated for these two States. The general percentage of trachoma found is relatively low, being 9.1 per cent for Oregon and 14.21 per cent for Washington. One small school, however, the Colville Mission, presented the very high rate of 67.74 per cent.

Wyoming.—As might be expected from the heavy rate of infection found among the Shoshones and Arapahoes of the Wind River Reservation, the Indian boarding schools of this State presented a high percentage of trachoma among the pupils. Three boarding schools, with a total of 217 pupils, were examined by Herring, and 131 cases of trachoma found, or 60.36 per cent.

It is evident from the foregoing that trachoma is widely prevalent in the Indian boarding schools, and to a greater extent than among the whole number of Indians examined. The conclusion seems inevitable, therefore, that these institutions constitute an important contributory factor to the dissemination of this disease, and may be the means of infecting Indian populations among whom the disease is absent or uncommon.

PREVALENCE OF TRACHOMA IN INDIAN DAY SCHOOLS.

The data collected as to the prevalence of trachoma in Indian day schools were not so complete as those for the boarding schools for the following reasons: Many of the camps were visited on days when the day schools were not in session and the pupils were seen in their homes, or some day schools were located at such distances from agencies (90 to 100 miles) that it would obviously have been wasteful of valuable time to spend several days in travel to see 10 or 20 children when much larger numbers of Indians were at hand for examination. Nevertheless, from the observations made, it would seem that trachoma is, in many instances, as common in the day schools as in the boarding schools.

Thus Fricks in Arizona, as the result of the examination of 990 children in the day schools, found 409 cases of trachoma, a percentage of 41.31. This is greatly in excess of the general rate (24.9) found for the State. In California 11 day schools were examined with 131 scholars and a trachoma percentage of 14, in Colorado 1 with a percentage of 25.6, in Iowa 1 with a percentage of 36.66, and in Kansas 2 with a percentage of 41.93.

On the other hand, in Montana the result of the examination, by White, of 473 day-school scholars showed 94, or 19.87 per cent, to be trachomatous, a rate distinctly lower than that found in the boarding schools of the State, and lower than the general rate computed for Montana.

In Michigan, Minnesota, and Wisconsin, Clark examined 334 day scholars, with the result of finding 13 cases of trachoma, a percentage of 3.98. This percentage is relatively low, and corresponds to the low general trachoma rate in the sections where these day schools were situated.

In New York State 335 day-school scholars were examined by Leake, but, as previously stated, no cases of trachoma were found.

In North Carolina, 66 day pupils were examined and 6 cases of trachoma found, or 9 per cent. This is 2 per cent in excess of the general rate determined for the Cherokee Indians.

In North Dakota 179 day pupils were inspected by Schereschewsky and 20 cases of trachoma found, or a percentage of 11.8, which is far below the average found either for the boarding schools or the whole number of Indians examined in the State. In South Dakota a similar condition is manifest. Out of 473 day scholars examined by the same investigator in this State but 23 cases of trachoma were found, or 4.9 per cent. This percentage is seen to be relatively very low when compared to the percentages found in the boarding schools of the State. Schereschewsky states that it can partly be accounted for by the disinclination manifested by the Indians of North and South Dakota to send their children to school when they are suffering from "sore eyes," and partly to curative measures which have been instituted by the Indian Office, particularly at Rosebud, among the Indian day scholars of these States.

In Oklahoma, among 34 scholars in 2 day schools, 23 cases of trachoma were found, or a percentage of 67.2.

In Utah, 1 day school was examined and 7 out of 10 pupils were found to be trachomatous. In Wyoming, 8 out of 14 day pupils were found infected with the disease.

The result of the examination of 274 day scholars in Washington by Lloyd gave 66 cases of trachoma present, or 24.48 per cent, a rate in excess of that prevalent in the Indian boarding schools and among the total Indian population examined in that State.

To summarize, out of 3,488 day scholars inspected and considered here, 752 cases of trachoma were found, or 21.55 per cent. If we exclude from the above figures the relatively large proportion of New York day-school scholars, in which no trachoma was found, we find a prevalence, exclusive of the day pupils of this State, of 24 per cent. This is in excess of the general average found for the total examinations, but it is considerably below the percentage found for the boarding schools.

It seems likely that the prevalence of trachoma in the day schools corresponds, in most instances, with the prevalence of the disease on reservations in general, and further strengthens the inference that the higher trachoma rate prevailing in boarding schools is due to the fact that the disease is being spread among the inmates of these latter institutions. Here it is necessary to state, however, that in certain of these institutions little trachoma was found, and the several officers reported in some of them excellent sanitary conditions.

THE PREVALENCE OF TRACHOMA AMONG RESERVATION INDIANS.

On examination of the reports of the several officers engaged in this investigation it appears that 17,822 reservation Indians were examined. This number consists of individuals above and below the school age and does not include the inmates of several boarding schools which were not listed in Table III, because of some defect in the data, nor day-school pupils who were visited in their homes.

Of this number 3,064, or 17.2 per cent, were found to be afflicted with trachoma. The prevalence among this group is seen to be distinctly below the rate found for the total number examined, the boarding-school rate and the day-school rate. On the other hand, owing to the greater average age of the individuals and the consequent longer duration of the disease, the majority of the instances of visual damage was found among their number. The percentage noted for the several States varied from 60.40 per cent in Oklahoma to 0 per cent in New York and Florida. Other States showing a high rate of prevalence were Utah with 39.2 per cent, Wyoming with 37.26 per cent, Nevada with 36.5 per cent, and Montana with 30.76 per cent. It is worthy of note in this State that the rate of prevalence among reservation Indians was found to exceed that among the boarding schools and day schools. States with a low rate of prevalence were Michigan with 1.21 per cent, Wisconsin with 4.39 per cent, and North Carolina with 5.45 per cent.

The following table gives the number of Indians examined in each State, the number of cases of trachoma found, and the percentage:

TABLE IV.—*Prevalence of trachoma among reservation Indians.*

[Exclusive of school children.]

State.	Number of Indians examined.	Number of cases of trachoma.	Per cent of trachoma.
Arizona	2,759	531	19
California	528	45	8.52
Colorado	191	17	8.81
Florida	22		
Idaho	307	46	15
Iowa	23	6	26.
Michigan	246	3	1.21
Minnesota	2,585	327	12.64
Montana	829	255	30.76
Nevada	348	127	36.5
New Mexico	962	214	22.24
New York	482		
North Carolina	110	6	5.45
North Dakota	2,478	565	22.8
Oklahoma	149	90	60.40
Oregon	266	31	11.65
South Dakota	3,289	544	16.54
Utah	125	49	39.2
Washington	359	78	21.7
Wisconsin	1,592	70	4.39
Wyoming	161	60	37.26
Total	17,811	3,064	17.2

The almost uniformly lower rate observed than in the schools and boarding schools is striking, and serves further to strengthen the evidence already adduced as to the part played by the schools in the disseminating of the disease.

On the whole it it evident, as the result of these examinations, that there is an exceedingly high prevalence of trachoma among the Indians in nearly all sections of the country.

INCIDENCE OF TRACHOMA ACCORDING TO AGE, SEX, AND DEGREE OF INDIAN BLOOD.

As a result of data compiled from the reports of inspections of the several officers and expressed opinions by them, some reference may be made regarding the incidence of trachoma according to age, sex, and degree of Indian blood among those affected.

Age.—Of over 2,000 cases af trachoma, among 10,425 Indians examined, in which records were kept and compiled regarding age, it was found that approximately 4.5 per cent were under 6 years of age, over 50 per cent were between 6 and 20 years of age, and the remainder above 20 years. It is thus evident that the disease falls heaviest on those of school age. The disease is rare among infants under 1 year of age, but a very few cases were found. The complications of the disease, when permanent, exert their ill effects in afterlife, frequently affecting ability to engage in useful occupation.

Sex.—Out of a group of 10,425 Indians examined in all sections, with 2,067 cases of trachoma among them, it was found that the incidence of the disease was slightly higher among females than among males. Of this total number examined, 5,303 were males with 984 cases of trachoma, and 5,122 females with 1,083 cases.

Degree of Indian blood.—From the observations made it was evident that the incidence of trachoma was greater among the full bloods than among the mixed bloods examined. This appeared to be attributable, however, to the more prosperous circumstances and better living conditions among the latter.

DAMAGE TO VISION DUE TO TRACHOMA.

A complete census would have been necessary to determine the total percentage of blindness due to trachoma on the several reservations visited. This was obviously impracticable within the time allotted for the inspection, but observations on this point were made among those examined.

These data have been compiled in the case of 23,560 Indians examined. Of this total number 5,505 had trachoma, of which 527 showed marked damage to vision. These injuries were of the usual type and consisted variously of corneal ulcers, corneal opacities, pannus, entropion with keratitis, perforation of the cornea and resulting evacuation of the contents of the eye, etc. In 141 individuals the damage consisted in blindness of one or both eyes.

This by no means represents the extent of visual damage among Indians due to trachoma. It should be borne in mind that in but relatively few cases among the school children had the disease progressed sufficiently far to produce corneal complications, and it was this class of persons that constituted the largest number examined. Moreover, Indians suffering from marked visual disturbance and blindness were least accessible for examination, and some of these unfortunates evaded the examiners because of their sensitiveness in regard to deformities, particularly blindness.

At the San Carlos Reservation, Ariz., out of 2,000 Indians with 11 per cent trachoma, 148 were examined when they came in to draw rations. Fricks states that these latter were the lame, the halt, and the blind of the reservation, and among them were found

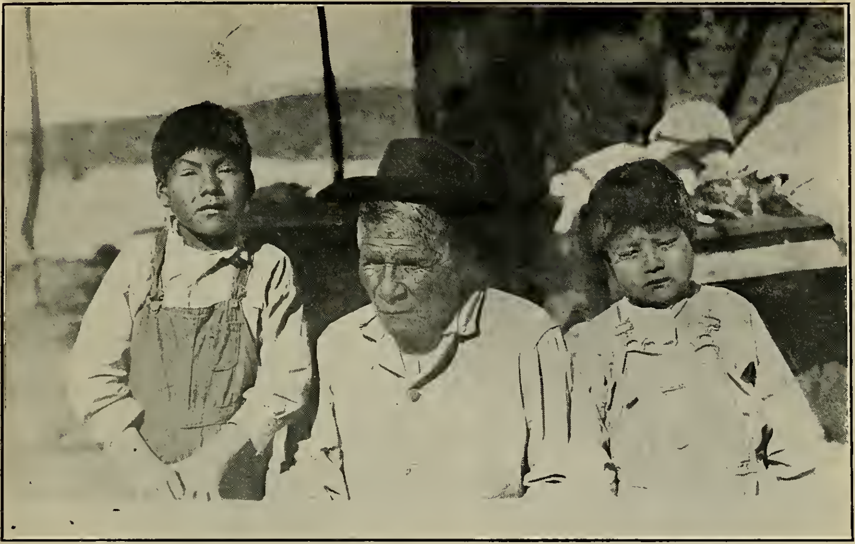

FIG. 7.—RINCON RESERVATION, MISSION INDIANS, CALIFORNIA.

The grandfather totally blind, from trachoma, and two grandchildren in the same house with severe cases. The mother, a daughter of the old man, and another child also infected.

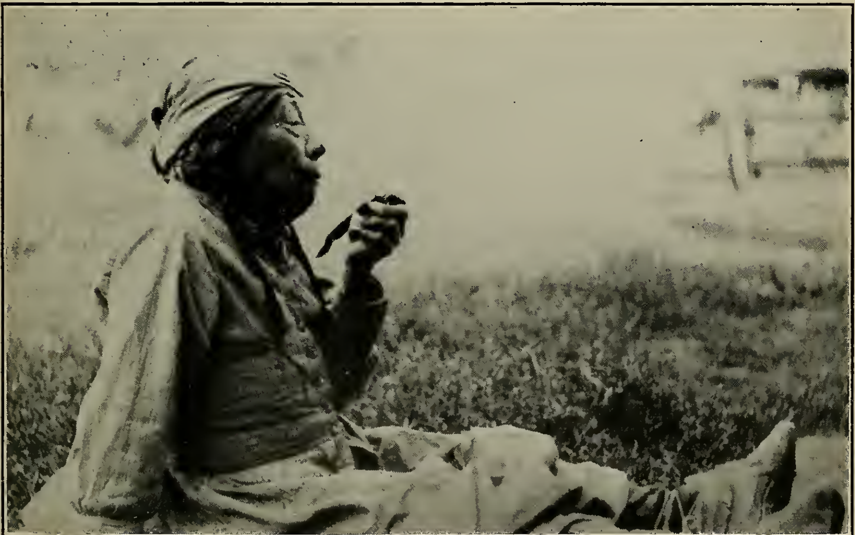

FIG. 8.—ONE OF THE MANY SUFFERERS FROM TRACHOMA NOW PARTIALLY BLIND. (PHOTO BY AN INDIAN ARTIST.)

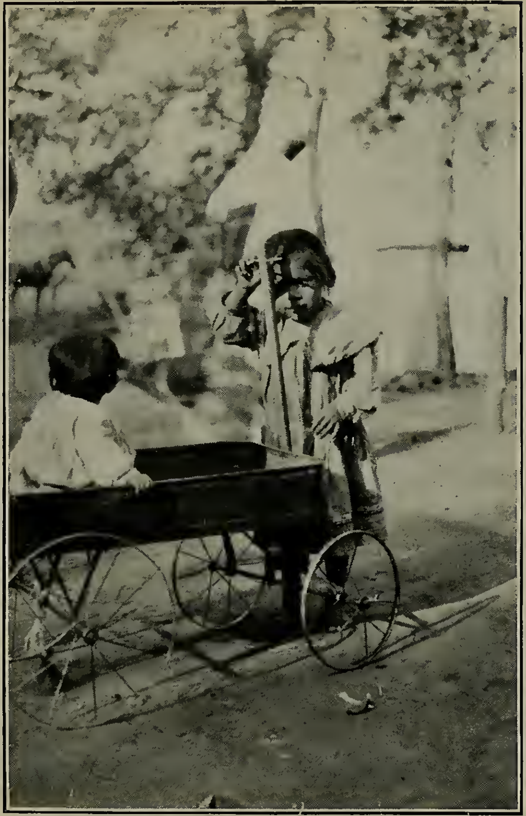

FIG. 9.—CHILD IN PAWNEE CAMP.

The child is suffering from trachoma, and has assumed a position to shield her eyes from light.

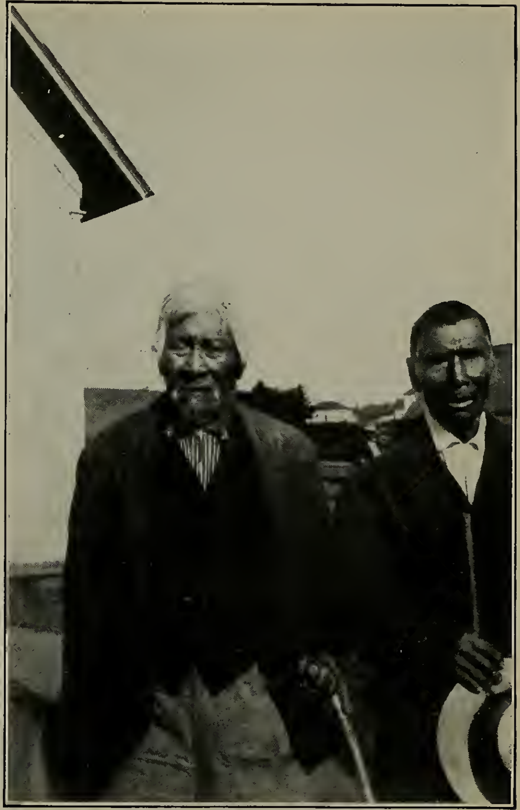

FIG. 10.—BOTH OVER 80 AND BOTH BLIND FROM TRACHOMA, SILETZ, OREG.

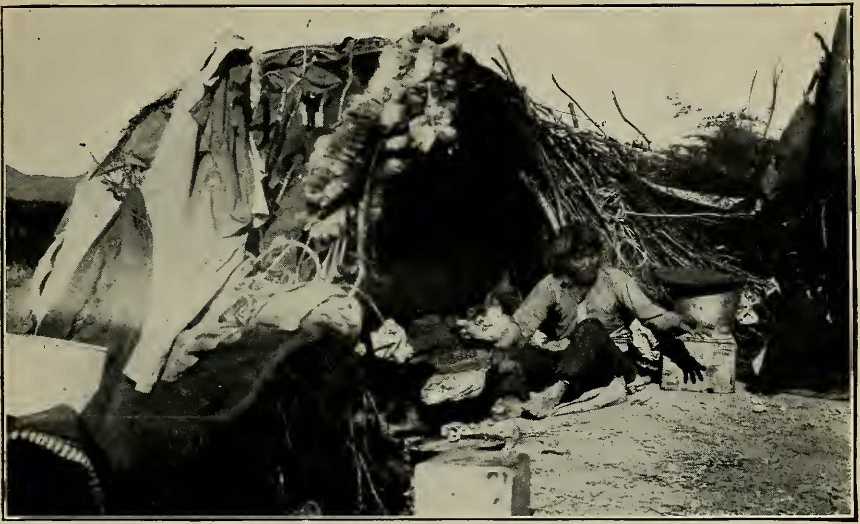

FIG. 11.—A BLIND WALAPAI AND HIS WORLDLY GOODS.

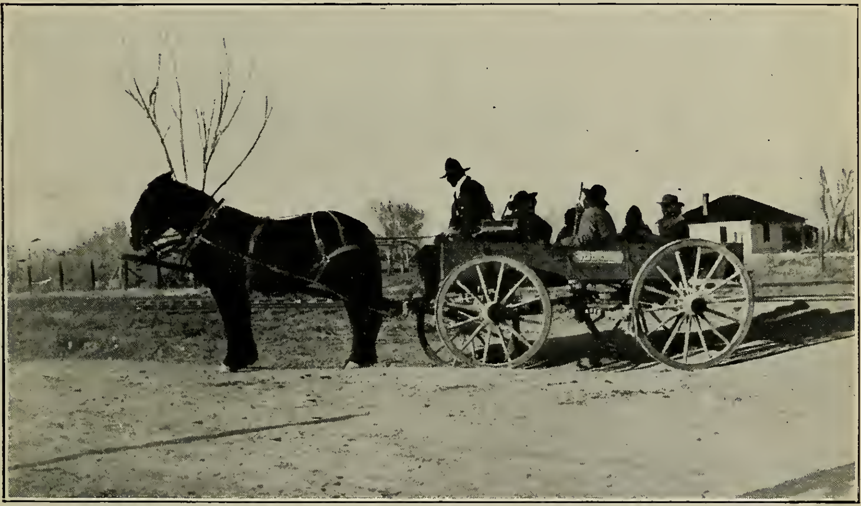

FIG. 12.—A WAGON LOAD OF INDIANS BLIND FROM TRACHOMA, AT WALKER RIVER RESERVATION.

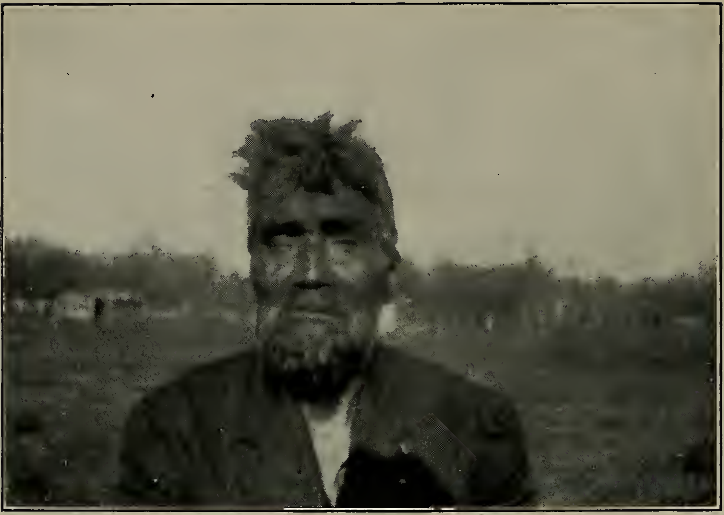

FIG. 13.—COMPLETE DESTRUCTION OF EYES OF INDIAN FROM TRACHOMA.

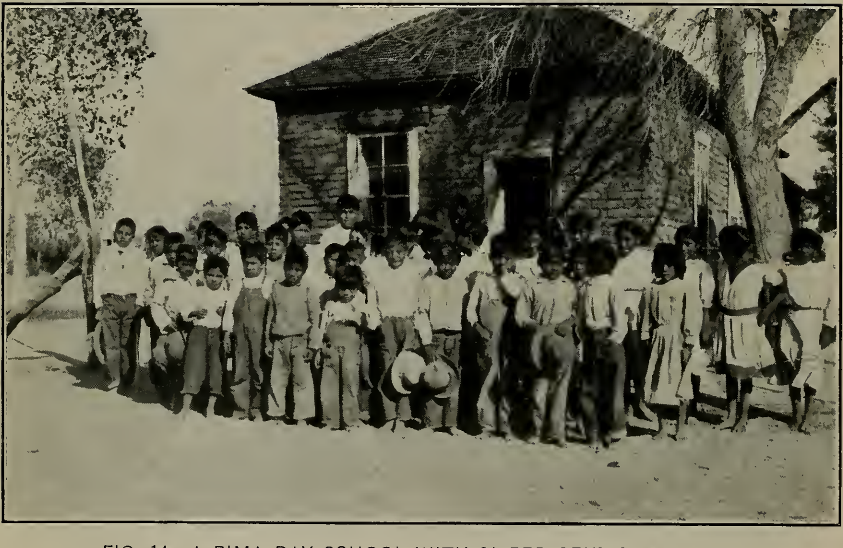

FIG. 14.—A PIMA DAY SCHOOL WITH 31 PER CENT TRACHOMA.

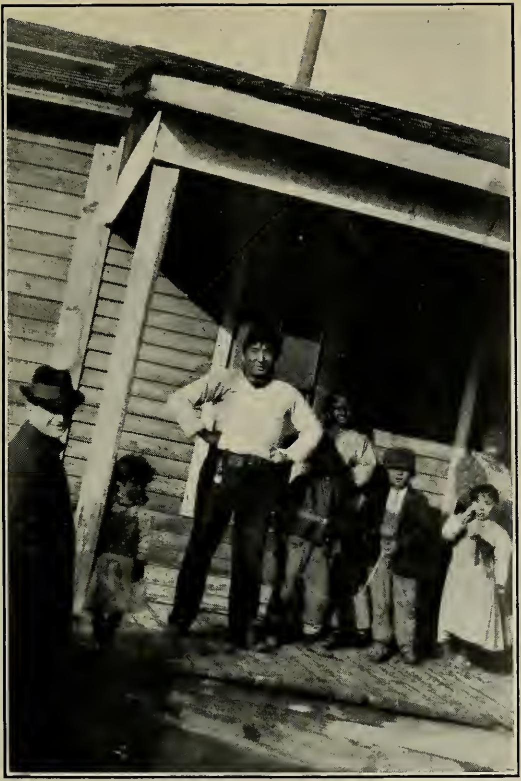

FIG. 15.—SMALLPOX AND TRACHOMA IN SAME FAMILY.

Four of this group just recovering from smallpox; and three have trachoma. Yakima Reservation.

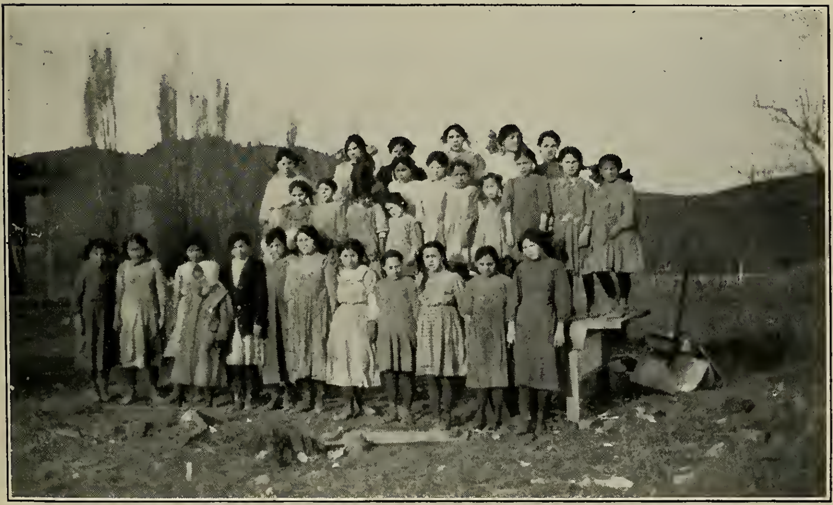

FIG. 16.—WHOLESALE INFECTION WITH TRACHOMA.

Twenty-one out of 31 of these girls are suffering from this disease. Colville Mission School, Wash.

15 blind from trachoma. Figured on this basis, a conservative estimate would give between 300 and 400 blind Indians in Arizona as a result of trachoma.

Among the Pueblo Indians in New Mexico Smith found trachoma not only very frequent, but the results unusually serious, 10 totally blind and 19 with vision seriously impaired as a result of the disease, having been seen by him among them.

Clark states that the greatest number of cases of trachoma with serious damage to vision in his territory was found on reservations most heavily infected and on which the infection had long existed.

The greater percentage of visual disturbance reported upon and due to trachoma appeared among the older Indians, since the condition was of long standing in many of these persons. At least 90 per cent of the complications found by Schereschewsky were in reservation Indians exclusive of school children, and he regards this as only natural in view of the long duration and chronic character of the disease.

SOURCE AND DURATION OF TRACHOMA INFECTION AMONG THE INDIANS.

According to Fricks, there is some basis for the belief that the infection of trachoma has been recently acquired by the Havasupais outside their reservation, and this is believed to be the case with the Navajos and their first cousins, the Apaches. How long the disease has existed among the purely desert Indians who are in no wise related is mere speculation, but that it is rapidly increasing is the opinion of those who have long known the Indians.

In referring to the possible original source of the infection of trachoma among the Indians of Kansas, Nebraska, Utah, Wyoming, and California, Dr. Herring states that it can not even be guessed at. In conversation with long-time white residents on and near badly infected reservations he was told that there appeared to have been as much blindness and defects of vision and "sore eyes" among the Indians 20 or 30 years ago as to-day. The question arises whether trachoma was really introduced among the Indians in recent times by the whites. Regarding this, Herring observes that the present extent of prevalence among Indians in the States mentioned does not depend on the amount of their contact with the white population; and in Kansas and Nebraska where the prevalence was not so great such contact had certainly been longer and closer than in Utah and Wyoming. In California also, where the prevalence was least of any of the States just mentioned, white contact has had its longest duration, dating back to the entrance of the Spanish padres in the latter half of the eighteenth century.

Among the Navajos of New Mexico Smith states that trachoma is apparently scattered throughout the tribe. He was unable to determine where or from what source the infection appeared, but expressed the belief that it was not of recent introduction.

In Idaho and Washington, Lloyd reports chronic cases which gave histories of having had the disease for from 15 to 25 years, but no facts were presented to show the origin of the infection.

According to Clark, trachoma is doubtless of more recent origin than tuberculosis, but has existed for many years. This was evidenced by the finding of many cases of long standing, played-out trachoma of years' duration, and cases that were contracted through contact with subjects long since dead.

No reliable data were available to indicate the origin or duration of the disease in Oklahoma. From statements of some of the older Indians themselves it appeared that the infection had prevailed among their tribes prior to removal from other sections of the country to Oklahoma.

There was evidence to show that trachoma has existed among the Indians of North Dakota for at least the last generation. No information bearing on the origin of trachoma in South Dakota was obtainable. That it has prevailed for a long period of time is evident. A considerable number of cases of long duration were seen. Upon questioning older Indians who were found affected it was learned frequently that they had had the same "sore eyes" for years, usually stating that they had contracted the disease when young, often while attending school.

On the whole, it appears that trachoma has been prevalent among Indians in widely scattered sections for many years, but the source of the infection among them as a race must, in all probability, remain a mystery.

The Prevalence of Tuberculosis Among the Indians.

The existence of tuberculosis among the Indians has been recognized for a long time. Available records of the past no doubt contain many errors due to the wide distribution and inaccessibility of the Indian population, failure to recognize and report cases of tuberculosis, and to the use of inaccurate nomenclature, so that neither the site nor nature of the lesion could be determined. The older records are filled with general terms such as "tubercle," "consumption," and "scrofula."

The records of recent years are more carefully kept, and taken in connection with a better understanding of tuberculosis and a more accurate recognition of tuberculous cases, furnish fairly reliable data for the estimation of the relative prevalence of tuberculosis among representatives of the three main races of the United States. The death rate from tuberculosis in these three races has been stated to be as follows: White, 1.73 per 1,000; negro, 4.85 per 1,000; Indians, 5.06 per 1,000. Based on this estimate and allowing one death among every seven persons affected, the case incidence of tuberculosis would therefore be 12.1, 33.9, and 35.4 per 1,000, respectively.

Although no accurate data could be obtained relative to the length of time tuberculosis has existed among the Indians visited by the officers engaged in this investigation, an increasing prevalence of this disease among them is shown by the records of the Indian Office and the fact emphasized in various reports submitted by that office from time to time.

By reason of the immense territory to be covered, the restrictions of time allotted to this survey, and the broad field of investigation, officers engaged in this duty found it impracticable to employ methods other than inspection and physical examinations of suspects. Limitations of time also precluded more than one examination of a tuberculous suspect. Two officers engaged in this survey, however, employed the tuberculin (Von Pirquet) test in a certain number of cases for the purpose of estimating the prevalence of tuberculosis among the tribes visited by them. The results of this test are given in another part of this report.

In consideration of the above-mentioned limitations of the examination, it is believed the amount of tuberculosis reported is lower than the number of cases actually existing at present among the Indians visited by these officers.

The significant importance of trachoma, one of the diseases specifically mentioned in the law providing for this investigation, among the school population necessitated the examination of a large number of Indian schools for this disease. These children were also inspected for the presence of tuberculosis among them. The very generally observed regulation of the Indian Office excluding tuberculous children from schools naturally resulted in the finding of a comparatively small number of cases of active tuberculosis in a large percentage of the population inspected.

Arizona.—Fricks reports an inspection of 5,873 Indians in Arizona. Of these, 2,224 were boarding-school children with a low percentage of tuberculosis because tuberculous children are excluded from these schools by regulation. There were found 114 cases of tuberculosis, namely: Pulmonary, 52; glandular, 54; osseous, 6; other forms, 2.

In discussing tuberculosis incidence in Arizona, Fricks states that the percentage of infection varies from 1.5 per cent among the White River Apaches to 14.6 per cent among the Walapais. He accounts for the low percentage of tuberculosis among the White River Apaches on the grounds that many of them live in isolated tepees built of arrow weed, and the custom of burning the tepee, with everything in it, in which one of them dies.

The highest general prevalence of tuberculosis in Arizona was found among the northwestern tribes, with a percentage of 8.3 among the Navajoes to 14.6 among the Walapais. All of these tribes are decreasing in number. The Walapais, therefore, are considered a menace to the public health by reason of this high disease incidence and the fact that they dwell in insanitary hovels at various points along the Santa Fe Railroad.

California.—In his report on the prevalence of tuberculosis among the Indians of California examined by him, Billings refers to the insanitary conditions of the homes of the Indians visited, the lack of personal cleanliness of the Indian himself, and his indifference and ignorance regarding the influence of such conditions on health.

The highest percentage of tuberculosis in California was found on the Round Valley Reservation, 15 per cent, and among the Indians in the San Quentin Penitentiary. He also gathered from morbidity statistics of this agency a record of 244 cases of measles and 552 of influenza, diseases which are frequently followed by tuberculosis.

Colorado.—Smith found a comparatively low percentage of tuberculosis among the Southern Utes of Colorado, though the result of the Von Pirquet test made on 65 school children at Ignacio, Colo., gave 81.5 per cent of positive reactions. It may, therefore, be assumed that the amount of infection at this point is high, and a more detailed examination of this population than was possible under existing conditions would probably reveal a greater number of cases of tuberculosis than were actually detected at the time of inspection.

Among the Southern Utes inspected at Navajo Springs, Colo., no cases of clinical tuberculosis were found. In the annual report of the Indian Office for the year 1912, these Indians are given special mention for freedom from tuberculosis. Their sanitary condition is considered the highest recorded among the Indians in New Mexico.

Florida.—Rucker inspected 22 Seminoles in Florida and found no tuberculosis among those inspected. The aloofness of this tribe made further examinations impossible, but the testimony of the whites who know them well leads to the belief that the disease is uncommon among them. This may be accounted for in part by the equable climate in which they live, their life in the open air, and their abundant food supply of fish and game.

Idaho.—Lloyd found 23 cases of tuberculosis among the 461 Indians of Idaho inspected by him, a case incidence of 49.8 per 1,000. His highest percentage of this disease was found on the Cœur D'Alene Reservation with 6.92 per cent. An examination of 81 Nez Percé Indians at Fort Lapwai revealed no tuberculosis. In respect to the Fort Lapwai Sanitarium School for Tuberculosis, he says:

> The site here is well chosen in so far as Idaho and Washington are concerned. The climate is good and milk, butter, and eggs, always an important item in such an institution, can be produced in abundance. Considering the difficulties required to be met, this institution is a very creditable one.

Iowa.—White found a percentage of 15 per cent among the Sac and Fox Indians of Iowa. This high percentage of tuberculosis is attributed to the general insanitary condition of the dwelling places of these Indians and to their habits. These Indians are also reported to be addicted to the use of the "Mescal Button," which seems to exert a very pernicious influence over them.

Minnesota.—Clark inspected 646 and Preble 187 Indian boarding school children in Minnesota, and found a total of 27 cases of tuberculosis, 10 pulmonary, 16 glandular, and 1 osseous, a percentage of 3.24. The high percentage of tuberculosis, 14.28 in the Vermillion Lake School at Tower, Minn., is caused by glandular cases entirely.

At the Cass Lake Indian Boarding School the percentage of tuberculosis was found to be 4.25. This school is located 7 miles by water from the agency physician and is therefore subject to infrequent medical inspection. In St. Benedict's Industrial Indian Mission School, White Earth Reservation, a percentage of 3.19 was found.

He also inspected 2,709 reservation Indians, exclusive of children in Indian boarding schools, and found 145 cases of tuberculosis, 5.35 per cent. Of these 145 cases, 90 were pulmonary, 34 glandular, 19 osseous, and 2 cutaneous forms of this disease. These cases were found in a house to house canvass of the various reservations, and are a conservative representation of the prevalence of tuberculosis among the Indians of the State.

The highest percentage of tuberculosis, 23.07, was encountered in a small nonreservation settlement at Pelican Point, near Orr, Minn. Pelican Point is an old Indian settlement, the Indian homes are disgustingly filthy, and the Indians themselves very poor and much addicted to the use of intoxicants.

On the Leech Lake Reservation the tuberculosis rate was found to be 49.2 per 1,000, Nett Lake Reservation 48.2 per 1,000, Red Lake 55.4 per 1,000, and White Earth 46.8 per 1,000 among Indians inspected for this disease, exclusive of Indian boarding school children, as compared to the estimated 5 per 1,000 among the white population. Clark reports:

> At Pine Point, White Earth Reservation, the percentage of tuberculosis is 9.52, while that for the whole reservation, including Pine Point, is but 4.68. This percentage of tuberculosis is associated with a like high trachoma percentage, 36.05, and presents a situation demanding specific recommendations.

Michigan.—Clark inspected 333 children in Indian boarding schools in Michigan and found 8 cases of tuberculosis, 6 pulmonary and 2 glandular, a percentage of 2.40. The pulmonary cases were in the early stages of the disease, held under close observation and therefore only a potential danger to the rest of the school population.

In addition, he examined 310 reservation Indians, exclusive of school children, and found 7 cases of tuberculosis, 6 pulmonary and 1 osseous, or 2.25 per cent.

At Bay Mills, a nonreservation settlement, the highest percentage 3.54, was found. These Indians have for years been in contact with the white population engaged in the lumber industries of that region. The sanitary condition of their homes is only fair.

Among Indians of the Mackinac Agency, Baraga, Mich., he found very little tuberculosis, only 1.18 per cent. The disease is rare among the white population of this section. The homes of the majority of these Indians compare favorably with those of white people in like circumstances. Still, their comparative freedom from tuberculosis is largely due to lack of exposure on account of rarity of the disease in the surrounding white population.

Kansas, Nebraska, and *Oklahoma.*—By reason of the location of large nonreservation boarding schools and the consequent examination of a relatively larger proportion of school children than reservation Indians in these States, the reported percentage of tuberculosis found is low. This is due to a regulation of the Indian Service excluding tuberculous children from the Indian schools, and the artificial reduction of the tuberculosis rate in the school population caused thereby. Guthrie, however, in an examination of 305 Cheyennes and Arapahoes in Oklahoma, found 22 cases of tuberculosis, or 7.21 per cent. His next highest percentages were among the Poncas and Seminoles, these percentages being 5.30 and 4.31, respectively.

Montana.—Among 2,042 Indians inspected in Montana for tuberculosis White found 247 cases, namely: Pulmonary, 58; glandular, 183; osseous, 6; a percentage of 12.14. The highest percentage of tuberculosis among the Indians of this State, 19 per cent, was found among the Flathead tribe and the lowest, 5.30 per cent, among the Northern Cheyennes. Other percentages were, Piegans, Blackfeet Reservation, 10.34 per cent; Sioux, Fort Peck, 13.57 per cent; Gros Ventre, Assiniboin, Arapaho, and Sioux, Fort Belknap, 14.10 per cent; Crow, 15.38 per cent. He attributes this great prevalence of tuberculosis among the Indians of Montana to filthy habits, insanitary homes, and the use of intoxicants by these Indians.

Nevada.—Billings inspected 522 reservation Indians in Nevada and found 62 cases of tuberculosis, 21.43 per cent. These cases are classified as 38 pulmonary, 21 glandular, 3 osseous, and 1 cutaneous. A percentage of 32.67 of tuberculosis was found among the Paiutes of Pyramid Lake Reservation. Among 101 Indians examined on this reservation he found 33 cases of tuberculosis classified as pulmonary, 29; glandular, 3; osseous, 1.

Among 185 Paiutes and Shoshones examined on the Western Shoshone Reservation, 30 had pulmonary tuberculosis, 10 glandular, and 1 osseous, a total of 41; a case incidence of 221 per 1,000 of those examined.

Among 100 Paiutes examined at Fort McDermitt were found 16 pulmonary and 2 glandular tuberculosis cases, a total of 18, or 180 per 1,000.

Among 329 children examined in four Indian schools he found 62 cases of tuberculosis, or 18.84 per cent. These school children are drawn from an Indian population in which tuberculosis is found to prevail to an alarming extent. This accounts for the large number of cases in the schools inspected. He explains this heavy prevalence on the ground that Indian customs and insanitary dwellings favor the spread of tuberculosis.

New York.—Leake reports a tuberculosis percentage of 1.27 among 865 Indians examined by him for this disease in New York. The average duration of illness, four years in the pulmonary cases, he properly infers does not indicate an extreme susceptibility on the part of these Indians when once infected.

From rather indefinite data Leake is inclined to think tuberculosis is on the decrease among the Iroquois Indians, or else many affections believed to be tuberculosis in the past were not tuberculosis at all.

The sanitary condition of their homes is comparable to that of white people in like circumstances. Furthermore, the nutrition of these Indians is good, their food supply being largely of home production, and eggs, meat, vegetables, and fruits are used daily in most families.

New Mexico.—The highest percentage of tuberculosis among the Indians of New Mexico is found by Smith among the Apaches of the Jicarilla and Mescalero Reservations, being 9.45 and 7.21 per cent, respectively.

The Jicarilla Reservation Indians, who dwell in tepees, present a higher percentage of tuberculosis than is found on the Mescalero Reservation where the majority of the Indians are domiciled in houses, showing that careless habits, poverty, lack of proper food, lack of cleanliness, and bad social customs after all are the great determining factors in the spread of this disease.

On the other hand, he reports that the lowest percentage of tuberculosis prevails among the Navajo and Zuni tribes. The Navajos are prosperous and well fed, it being a poor family that does not possess from 100 to 1,000 head of sheep and goats. The construction of their dwelling, the "Hogan," permits ventilation. It is a custom of these people to spend much of their time sitting outdoors in the sunshine in front of their "Hogans."

The Zunis are thrifty and industrious. The interiors of their dwellings are often whitewashed and their construction facilitates ventilation. Moreover, the floors of these dwellings are often renewed by spreading on a thin layer of moist material which subsequently hardens. Thrift, good food supply, and improved sanitary condition of the home are the main cause of the low comparative percentage of tuberculosis among these people.

Smith employed the Von Pirquet test for the determination of tribal infection to tuberculosis. This test consists in the inoculation of the skin with tuberculin, a subsequent reddening at the site of the inoculation within 36 to 48 hours indicating a positive reaction. In all, 1,225 children of school age were inoculated, with 760 positive ractions, a percentage of 64.40.

Since the Von Pirquet test is not a method diagnostic of active tuberculosis, but simply an accurate index of exposure to tuberculosis, by reason of the fact that it is an evidence of tubercular infection, either remote or present, upon which recovery may or may not have supervened, the percentage of 64.4 is indicative of a heavy infection among the Indian tribes of New Mexico and of the amount of exposure to infection.

McNeil[1] reports the percentage of positive reactions to this test among 531 white children to range from 14.1 per cent for children under 1 year to 55 per cent in girls from 11 to 14 years. A group of 170 boys from 11 to 14 years out of the total number gave 60.5 per cent.

Smith's figures show a considerably higher percentage of positive reactions among the Indian children on whom he made this test, evidencing wide infection, but also indicating considerable resistance on the part of these Indian children to tuberculosis in spite of insanitary surroundings. A further evidence of this latter fact was seen in the examination of the chests of 83 children, giving a positive reaction of 57.8 per cent without finding any clinical tuberculosis.

These very valuable observations support the contention that the Indian is not peculiarly susceptible per se to tuberculosis, but that the great prevalence of this disease among them is due largely to their social habits and insanitary surroundings.

The tabulation by Smith of his results is presented in the following table:

TABLE V.—*Comparative death rate from tuberculosis—Tuberculin reactions.*

Tribe.	Number of years' statistics.	Total number of deaths.	Deaths from tuberculosis.	Percentage of deaths from tuberculosis.	Percentage of positive tuberculin reactions, children under 11 years.	Percentage of positive tuberculin reactions, children over 11 years.
Mescalero Apache	10	220	89	40	[1] 63.6	[1] 82.3
Jicarilla Apache	2	100	41	41	68.7	95.5
Southern Ute (Ignacio, Navajo Springs)	2	24	10	41.66	72.4	88.8
Southern Ute	[2] 2	10	2	20	75	62.5
Navajo	[2] 4	[3] 77	[3] 41	[3] 53	46	78
Zuni	10	[4] 371	18	4.85	26.8	55.38
Taos	15	(5)	4	(5)	3.5	1.42
Laguna	5	140	31	22	44.6	63.15
San Juan, Santa Clara, San Ildefonso, Nambe, and Tusuque	2	59	7	11.9	70	81
Cochiti	9	125	11	8.8	[6] 50	[7] 44

[1] Boys only.
[2] Incomplete.
[3] Not representative in a population of 8,000.
[4] Known causes only.
[6] Unknown.
[6] Only 2 subjects.
[7] Only 9 subjects.

Table V shows the percentage of positive reactions to the tuberculin (Von Pirquet) test as compared with the death rate from tuberculosis compiled from the agency records among the Indians of New Mexico. It will be seen that a high percentage of reactions to the tuberculin test is found associated with a like high death rate from tuberculosis. Therefore the result of this test in a given population under known conditions not only enables us to calculate the probable death rate from tuberculosis, but also serves as an index of the actual prevalence of this disease.

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[1] Edin. Med. Jour. April, 1912.

North Carolina.—Fricks examined 317 Cherokees in North Carolina and found 6 cases of tuberculosis, 4 pulmonary and 2 glandular, a percentage of 1.89. He says: "The Cherokees, numbering 2,115 with 41 per cent full bloods and 59 per cent mixed, are citizens of North Carolina. They live just as the poorer white mountaineers of that section."

North and South Dakota.—North and South Dakota are treated as a unit in the consideration of the prevalence of tuberculosis among the Indian population because of their contiguity, and also because two officers, Schereschewsky and Preble, collected data independently in these two States.

In all, 9,568 Indians were examined in these two States and 361 cases of tuberculosis found.

Tuberculosis incidence was considered by each of the two officers from the standpoint of—

(1) Tuberculosis in reservation Indians exclusive of schools. Of these, 5,813 were examined, and 296 cases of tuberculosis found, a percentage of 5.09. Of these there were 162 pulmonary, 108 glandular, 19 osseous, and 7 cases of all other forms of tuberculosis.

(2) Tuberculosis in Indian boarding schools. There were examined 3,103 Indian boarding-school children in these two States and 52 cases of tuberculosis found among them, namely, 18 pulmonary, 32 glandular, 5 osseous, and 1 of other forms, a percentage of 1.67.

(3) Tuberculosis in Indian day schools. Schereschewsky examined 652 children in Indian day schools of the two Dakotas and found 9 cases of tuberculosis, 4 pulmonary and 5 glandular, a percentage of 1.38.

Schereschewsky properly observes—

> Cases of tuberculosis found among the reservation Indians examined exclusive of those in attendance at schools give us a much better idea of the incidence of tuberculosis among the Indians of the Northwest than the tables relating to its prevalence in schools. In school children we are dealing with a class in which the incidence of tuberculosis is artificially diminished by the exclusion from their number of those suffering from the disease. Among reservation Indians such is not the case.

He found the highest percentage, 5.89, of tuberculosis among the Indians of North Dakota, on the Fort Berthold Reservation, and the lowest at the Turtle Mountain Reservation, where only 0.92 per cent of the Indians examined were found to be tuberculous. A compilation of agency mortality records by Schereschewsky shows that tuberculosis causes approximately 22.32 per cent of all the deaths in the reservations visited by him. This, he says, is twice the percentage, 11, found in the registration area of the United States. "The tubercular death rate is 6.99 per thousand, or 4.37 times the white death rate (1.63) per thousand."[1]

Oregon.—Billings inspected 316 Indian children in the Salem non-reservation boarding school and found 11 cases of pulmonary tuberculosis, 29 glandular, and 3 osseous, a total of 23, or 13.6 per cent.

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[1] Mortality Statistics, Bureau of Census Bul. 109.

Among 788 reservation Indians examined were found 61 pulmonary, 59 glandular, 8 osseous, and 3 of other forms of tuberculosis, a total of 131, or 16.62 per cent.

The highest percentage, 24.56, of this disease was found in the various tribes of the Siletz Reservation. Percentages for other reservations are: Klamath Lake, 20.27; Umatilla, 20.66; and Warm Spring, 23.75.

Pennsylvania.—Among the 552 students of the Carlisle Indian Boarding School, Carlisle, Pa., who were inspected for tuberculosis, 26 cases of this disease were discovered, or 4.7 per cent. Of these cases of the disease 8 were pulmonary, 17 glandular, and 1 osseous. The Carlisle school receives pupils from nearly every tribe in the United States. In view of the great prevalence of tuberculosis among some of these tribes, a certain number of cases of tuberculosis may be expected to develop in this student body in the course of each scholastic year.

At Carlisle are found facilities for caring for a small number of tuberculous students, who are in the early stages of this disease. Attached to the school hospital are sleeping porches wherein students infected with tuberculosis sleep in the open air.

An agreement has also been entered into by the school authorities with the State of Pennsylvania whereby certain of these Indian students in the more advanced stages of tuberculosis are taken into the State Tuberculosis Sanatorium at Mount Alto, Pa.

Utah.—Among the Uintah and Ouray Indians of Utah, 182 were inspected and 8 cases of tuberculosis found, 4 pulmonary, 3 glandular, and 1 osseous, a percentage of 4.39.

Virginia.—Cumming inspected 43 Indian students at the Hampton Normal Institute, Hampton, Va., and found 3 cases of tuberculosis, 2 pulmonary and 1 osseous, a percentage of 6.97.

Washington.—Lloyd inspected 1,347 Indians, including school children, in Washington, and found 73 cases of tuberculosis, namely, 48 pulmonary, 21 glandular, and 4 osseous, a percentage of 5.41 for the State.

The large number of school children inspected and included in the total number used for the calculation of the percentage of prevalence of tuberculosis in this State, reduces the tuberculosis rate by reason of the exclusion of known tuberculous pupils from Indian schools. It is therefore believed that the prevalence of tuberculosis among these Indians is much greater than shown by the figures presented herewith.

Among the Dwamish and allied tribes, exclusive of the Cushman and Tulalip Schools, Lloyd found the following percentages of tuberculosis according to reservations: Lummi, 11.95; Suquamish, 13.51; Swinomish, 10.20. On the Colville and Spokane Reservations the percentage of tuberculosis was found by him to be 8.26. Washington may therefore be classed with California, Oregon, and Nevada as one of the States in which the greatest prevalence of tuberculosis was found in the course of this investigation.

Lloyd considers tuberculosis a serious problem among the Indians of Washington. Specific mention is also made of overcrowding in poorly ventilated houses as the principal factor in producing this heavy tuberculosis infection.

Wisconsin.—An inspection for tuberculosis was made of the Indians in all boarding schools and reservations in Wisconsin. A total of 1,703 reservation Indians, exclusive of school children, was inspected and 52 cases of tuberculosis were found, a percentage of 3.05 for the State. The greatest relative number of tuberculosis cases was found among the Indians of the Lac Du Flambeau Reservation, with a percentage of 6.48. The majority of these Indians dwell in very insanitary homes and their customs and habits favor the spread of this disease among them.

The following percentages of tuberculosis were found among the Chippewas of Wisconsin: Lac Courte Oreille, 3.72 per cent; La Pointe, 4.73 per cent; Red Cliff, 2.89 per cent.

Among the Monominees and Oneidas the percentage of tuberculosis among those examined was found to be 1.35 and 2.76, respectively. The sanitary condition of the majority of the homes visited among these Indians was good. The Oneidas cultivated a considerable part of their lands and are self-supporting.

Among the 1,296 children examined in the Indian boarding schools of Wisconsin were found 37 cases of tuberculosis, of which number 24 were pulmonary, 9 glandular, 3 osseous, and 1 cutaneous, or 2.98 per cent.

At the Lutheran mission, Stockbridge Reservation, 8.88 per cent of tuberculosis was found. In the Government school at Keshena, Menominee Reservation, the percentage was 7.69. This percentage includes the children of this school transferred to the agency hospital at that place.

The presence of tuberculosis in these boarding schools, however, is adventitious and due to reluctance on the part of the school authorities to return children, in the early stage of this disease, to insanitary homes and to a poor food supply.

The tuberculosis case incidence among the Indians of Wisconsin, inclusive of school children, according to data collected in this investigation, is 29.6 per 1,000.

Wyoming.—Among the Arapahos and Shoshones of the Shoshone Reservation in Wyoming, 392 Indians were examined and 13 cases, or 3.31 per cent, of tuberculosis was found.

CONSIDERATION OF RECORDED DEATHS FROM TUBERCULOSIS.

During the inspection complete data were not found at all the agencies by officers engaged in the work. On request, therefore, the Office of Indian Affairs furnished a compilation from their records of the birth rate, death rate, and number of deaths reported as due to tuberculosis among the Indian population of the United States during the fiscal year 1912. From these data was compiled the following table. It is proper to add that, in view of the known difficulties on many of the reservations in obtaining accurate information as to the causes of deaths among Indians, some of these figures must be in the nature of estimates. It is likely that many deaths among Indians are considered by them to be due to tuberculosis, and so reported to the agency, when no physician has been called, that were not caused by this disease at all.

TABLE VI.—*Indian birth rate, death rate, and death rate due to tuberculosis, 1912.*

[From a compilation by the Office of Indian Affairs.]

State.	Population.	Births during year.		Deaths during year.		Deaths due to tuberculosis.	
		Total.	Per 1,000.	Total.	Per 1,000.	Total.	Per 1,000.
Arizona	38,383	2,187	57	2,187	57	873	22.7
California	8,637	169	20	250	29	63	7.5
Colorado	860	35	41	16	19	2	2.3
Idaho	3,823	110	29	127	33	47	12.2
Iowa	364	13	36	18	41	12	32.8
Kansas	1,317	47	36	40	30	11	8.3
Michigan	255	4	16	6	24	3	11.7
Minnesota	10,843	439	40	290	27	96	8.6
Montana	11,242	433	38	311	27	112	9.9
Nebraska	3,832	141	37	119	31	10	2.6
Nevada	2,573	78	30	95	37	38	14.8
New Mexico	10,689	580	54	319	29	39	3.6
New York	4,058	101	24	120	29	....	....
North Carolina	2,078	121	58	58	28	16	7.7
North Dakota	8,389	342	41	210	25	61	7.2
Oklahoma	15,896	613	38	422	27	85	5.3
Oregon	3,401	117	34	130	38	29	8.5
South Dakota	20,333	774	38	627	38	241	11.8
Utah	1,309	38	28	35	27	11	3.2
Washington	11,740	294	25	262	22	99	8.4
Wisconsin	9,816	344	35	247	25	46	4.6
Wyoming	1,697	68	40	60	35	7	4.1
Total	171,535	7,048	41.08	5,949	34	1,901	11.0

It will be observed on comparing this table with the case incidence of tuberculosis found, by the officers engaged in this investigation, among these Indians examined, such incidence is correspondingly high on one or more reservations in the majority of the States in which the tuberculosis death rate is high.

Mention has been made in another part of this report of the inability of the medical officers engaged in this investigation to make repeated examinations of tuberculous suspects by reason of the short time allowed for the completion of the survey. The detection of tuberculosis may not be easy in its earliest stages even with the aid of all modern appliances in use for that purpose, and then only after repeated examinations of the suspected subject. The medical officers were restricted to the making of a physical examination of each suspect, and to but one examination. For these reasons it is believed the percentages of tuberculosis incidence found during this investigation are lower than a more detailed and prolonged inspection would reveal, and may be considered in the nature of a preliminary sanitary survey. However, this survey as conducted has revealed so great a prevalence of tubercular infection among the Indians inspected as to warrant the immediate adoption of measures for the relief of this situation in the Indian population of our country.

PREVALENCE OF SMALLPOX AMONG THE INDIANS.

Inasmuch as smallpox is highly contagious, it occurs usually in the form of explosive outbreaks. It could not be expected, therefore, that many cases would be encountered in widely scattered sections of the country within the limited time devoted to these inspections of Indian reservations and boarding schools. For the purpose of this report, therefore, it became necessary to depend for evidence of the prevalence of the disease on: First, actual cases encountered; second, reports of cases; third, pock-marked Indians; fourth, the completeness of vaccination as determined by examinations of a large number of vaccination scars.

SMALLPOX CASES INSPECTED.

A total of 6 Indians was seen who were suffering from smallpox. One of these cases was seen by Clark at the Red Lake Reservation, Minn., in the person of a woman who had been vaccinated many years ago. The disease was of a mild character, and the source of the infection could not be traced. The remaining 5 cases were seen by Lloyd on the Yakima Reservation in Washington.

REPORTS OF CASES AND OUTBREAKS OF SMALLPOX.

Such records as were examined at the various reservations furnished unsatisfactory data generally regarding the past prevalence of smallpox, nor were the records of States inquired into more satisfactory. Information of outbreaks in the past was obtained by the officers, however, on a number of reservations.

Arizona.—As a result of inquiry and examination of records, Fricks states that there has been no smallpox reported on any of the reservations in Arizona since 1909, when there was an epidemic of 60 cases with no deaths at Fort Mojave Boarding School. Severe and extensive epidemics were reported previous to 10 years ago.

California, Nevada, and *Oregon.*—Judging from the places inspected in these three States, Billings states that smallpox may now be considered a disease of no more frequency or of no greater severity among Indians than it is among people of any other race. He found a history of one case occurring five years ago (diagnosed by an Indian) on the Western Shoshone Reservation, Nev., and of 5 occurring 9 and 10 years ago. Some of the reservations had been 20 years without a case. In respect to the past prevalence of the disease, Billings states as follows:

> The only history of this disease is almost entirely hearsay as the epidemics which have occurred were before the advent of many white men and long before any attempt at keeping records was made. Chief Charley Shoplish, an Indian 95 years of age, told me of the great epidemic among the Walla Wallas in 1868 in which he said over 1,500 died and the tribe was nearly annihilated. The fact that it is very unusual to see a full-blood Walla Walla now seems to give some weight to this statement.

Colorado and *New Mexico.*—In Colorado, Smith states there were 23 cases and 1 death in 1911 among the Southern Ute Indians of Ignacio, but that the Southern Utes of Navajo Springs have been free from the disease. The superintendent at the reservation was also quoted as saying that to his personal knowledge no case of smallpox had occurred among these Indians for at least 6 years.

Vital statistics were available at the agency of the Mescalero Apache Indians for a little over 10 years, but no cases of smallpox were recorded during this time. Neither were any cases reported or recorded among the Jicarilla Apaches for 14 years.

No cases of smallpox within recent years were recorded among the Navajo Indians of New Mexico. Regarding the Zuni Indians, Smith states as follows:

> No Indians have suffered more severely from smallpox than have the Zuni Indians, who in 1898 and 1899 from November to February, lost approximately 555 out of a population of about 2,000 at the time. The number of cases is unknown, but I am reliably informed that over 900 freshly pock-marked Indians were counted after the epidemic had subsided.

There were no evidences of a recent epidemic of smallpox among the Pueblo Indians.

Idaho and *Washington.*—In Idaho, Lloyd reports that 19 cases of smallpox occurred on the Fort Hall Reservation, Idaho, during the fiscal year ended June 30, 1912; all recovered. At the Fort Lapwai Reservation smallpox had not occurred for some time. At the Coeur D'Alene Reservation and School, Idaho, the disease had not prevailed for some time, nor had it at the reservations in Washington with the exception of the cases mentioned above as seen at the Yakima Reservation.

Minnesota and *Wisconsin.*—The last general epidemic of smallpox swept through the Indian population of Minnesota in 1901, the mortality being very low. Three cases of the disease developed in the Oneida Boarding School, Wis., during the present year without mortality. Clark states that the source of infection was probably Green Bay, Wis., 10 miles distant, where smallpox was quite prevalent at the time.

The Tomah School in Wisconsin had 120 cases in 1903, with 1 death. In the opinion of Clark, the general vaccination of the Indian population in these States will protect them from any general epidemic in the near future and modify the severity of such sporadic cases as may occur.

New York.—No case of smallpox was seen. On the Allegheny Reservations there is a history of three outbreaks of the disease—one in 1869, when there were numerous cases and deaths; one in 1892, when there were 6 cases, 4 being fatal; and one in 1904, when there were 22 cases.

Several of the recovered cases from these epidemics were seen by Leake, none of whom had been vaccinated prior to contracting the infection.

On the Cattaraugus Reservation a history was obtained of numerous cases of smallpox in 1885 and 1890, and 4 cases in 1912.

North and *South Dakota.*—No case of smallpox was seen nor heard of on any of the reservations visited. Smallpox was generally prevalent throughout the northwest in 1907, and outbreaks of the disease were reported as having occurred at Turtle Mountain and Fort Berthold Reservations, N. Dak., at that time. The prevailing type of the disease was mild, and but few deaths resulted.

In South Dakota histories were obtained of outbreaks in 1907 and 1911 on Pine Ridge and Rosebud Reservations. At Lower Brulé, during January and February, 1911, 24 cases were recorded by the agency physicians, and just prior to this outbreak there occurred 6 cases of "varicella." Four cases of smallpox were recorded at the Yankton Agency between April 28 and May 20, 1912. The source of infection in these cases was not determined, but it was brought in from some neighboring town.

The contract physician for the boarding school at the Sisseton Agency reported the occurrence of an epidemic of smallpox on this reservation during the year 1903 at the time of a rather widespread outbreak in this part of the State. It was stated by this physician that about 200 cases occurred on the Sisseton Reservation, with a mortality estimated at 15 per cent. It seems probable that smallpox has not prevailed to any extent in recent years among the Indians in the Dakotas.

Oklahoma.—No case of smallpox was seen in the State either among whites or Indians, but the disease has been prevalent in the State for some years. Since 1908 Guthrie states smallpox has been reported every month in the year until September, 1912, when no case was recorded.

The earliest accounts of smallpox among Indians that were obtained dated back to 1899 and 1900 when, from the accounts, the disease must have been quite generally epidemic throughout the State, or Territory as it then was. No records were found anywhere that would throw any light upon the severity of the epidemic, its distribution, or mortality, and the only data obtainable both for this and recent outbreaks were, according to Guthrie, "word of mouth" accounts received from superintendents, school matrons, farmers and other employees of the Indian Service, and often at great distance from the localities where the cases occurred.

From such accounts smallpox was prevalent in 1899 and 1900 among the Indians of the Five Civilized Tribes, especially in the Choctaw section; among the Caddo and Wichita Indians in Caddo County; among the Cheyennes and Arapahos on the Red Moon Reservation; and in the vicinity of Colony. Seventy-five pupils of the Riverside Indian School had smallpox in 1900. In 1899 a severe epidemic of this disease occurred on the Sac and Fox Reservation, with 115 cases and 45 deaths. At the same time there were 4 cases in the Sac and Fox School, with 2 deaths.

In 1904 there were 28 cases of smallpox among pupils of the Segar Indian School at Colony. In 1910, 42 or 43 cases of smallpox occurred at the Cheyenne and Arapaho School at Darlington among about 150 pupils. In December, 1910, 1 case occurred at the Segar Indian School at Colony, and during the following year there were 5 cases at the same school. In 1911, also, 1 case was reported on the Osage Reservation at Pawhuska.

From the above accounts it would appear that the disease for the past 12 years has been of a very mild type and with a very low mortality rate, with the exception of the epidemic on the Sac and Fox Reservation in 1899, and the epidemic among the Zunis in the same year.

POCKMARKS OBSERVED AMONG INDIANS.

Relatively few pockmarked Indians were seen on any of the reservations visited. This is evidence of a kind bearing on the past prevalence of smallpox or at least on its virulence. It must be remembered, however, that the type of smallpox that has prevailed in the United States during the past 15 years has been generally very mild, and many cases might occur without leaving its traces in the form of scars.

As an evidence of the great severity of the 1899 epidemic among the Zunis in New Mexico, Smith stated he was reliably informed that over 900 freshly pockmarked Indians were counted after the epidemic subsided. Eighty-seven pockmarked Indians were seen by Clark in Michigan, Minnesota, and Wisconsin, 39 of this number being at the Menominee Reservation, indicating a severe scourge of smallpox there years ago.

In North and South Dakota only a few Indians were seen who presented this evidence of having had the disease. Seventeen pockmarked Indians were seen by Schereschewsky in these States, but all were of long standing.

THOROUGHNESS OF VACCINATION AMONG THE INDIANS.

Since successful vaccination is a reliable preventative of smallpox, the thoroughness of its performance among the Indians is an evidence of their freedom from the disease in the past and an indication of their likelihood of escaping widespread epidemics in the future.

Dr. Fricks estimates that there are about 23,000 Indians in Arizona who have not been vaccinated, and mentions the possibility that the mild type of smallpox now prevailing in the United States might by its spread through such a large body of unvaccinated Indians revert to the virulent type once universally dreaded. It is known that virulent infections have recently occurred among whites in different sections of the country. Whether this is due to such reversion of type or to the existence of two strains, the one more virulent than the other, is not definitely known.

In California, Nevada, and Oregon, Billings reports almost all of the younger Indians vaccinated—probably 90 per cent—but this proportion dwindles very rapidly in Indians above 25 years of age until among the older people it is of rare occurrence.

Among the Mescalero Apaches and Jicarilla Apaches vaccination seemed thorough. Smith reported the same condition with respect to the Navajo school children in New Mexico, and he was informed that in the presence of a threatened epidemic a few years ago accessible Indians accepted vaccination without protest. He does not believe, however, that any large proportion of these Indians have received protection in this manner.

Among the Zunis in New Mexico it was evident that the community is only partially vaccinated. Out of 410 children of school age, only 150 had received protection. Among the Taos Indians, on the other hand, vaccination seemed to have been performed with a fair degree of thoroughness.

Among the Pueblo Indians of New Mexico vaccination likewise seemed thorough with the exception of Acoma, where it is resisted. At Cochiti also no vaccinating had been done for three years, and Smith believes it probable that vaccination is not very thorough there.

At the Fort Hall Reservation, Idaho, all children are vaccinated during the first two years of school life. Few children under school age are vaccinated. Practically all of the adults have submitted to the operation, and Lloyd states that about 85 per cent of those examined by him showed successful vaccination marks. A few had been revaccinated.

At the Nez Percé Reservation advantage had been taken of allotment payments of money, etc., to enforce vaccination, and it is only the younger children who have not been vaccinated. Some had been revaccinated, but this was not general. About 85 per cent of those examined by Lloyd at the Coeur D'Alene Reservation showed good vaccination marks. About 88 per cent of those seen by him at the Tulalip Reservation, the Swinomish Reservation and day school, the Lummi Reservation and day school, and the Suquamish Reservation had been vaccinated.

At day school No. 6 on the Colville and Spokane Reservations only 5 out of 14 pupils examined had been vaccinated. At day school No. 5 none of the 20 pupils examined had been vaccinated. At the mission school at St. Marys, near Omak, 75 per cent of the pupils had been vaccinated.

In Montana vaccination was reported by White to be generally performed.

Among the 6,997 Indians examined in Michigan, Minnesota, and Wisconsin, 2,067 had been vaccinated over seven years before and 2,932 within seven years. Over 70 per cent of those examined had, therefore, been vaccinated at some time during their life.

In North and South Dakota vaccination had been generally performed in the past. Recently, however, according to Schereschewsky, vaccination has not been thorough, particularly among children below school age. At the Pierre school, South Dakota, Preble states that only about 22 per cent of the children had been vaccinated, while at the Flandreau and Pipestone schools practically all showed good vaccination scars.

In Oklahoma all the Indians on the Sac and Fox Reservation were vaccinated at the time of the severe epidemic in 1900. A large percentage of the Indians on the Osage Reservation have been vaccinated according to the agency physician. With these exceptions Guthrie says vaccination "has not been carried out among many of the grown Indians and children who remain out of the schools." He further states that practically all children attending the schools are vaccinated at the time of or shortly after admission, but that among the Five Civilized Tribes this rule is not strictly enforced in a number of boarding schools.

It is evident from the foregoing that smallpox has not prevailed to any considerable extent among the Indians in recent years, but the incidence of this disease should be practically nil in any community depending on the thoroughness of vaccination. It is probable that vaccination has been as thorough among the Indians as among whites in the average community exclusive of cities, but that it is not thorough enough is evidenced by the occurrence of cases of smallpox among Indians. Obedience to sanitary laws is as much the duty of the Indian as anyone else, and superintendents and physicians should be held strictly accountable for the control of smallpox among the Indian population.

THE PREVALENCE OF OTHER INFECTIOUS AND CONTAGIOUS DISEASES AMONG THE INDIANS.

TYPHOID FEVER.

While typhoid fever is widely and inexcusably prevalent in nearly all the civilized communities of this country, and, on a priori grounds, therefore, should be relatively common among the Indians, we find, on the contrary, that the disease is rare on Indian reservations. All the officers engaged in the investigation agree as to its infrequence, and many of them comment on this seeming paradox.

Arizona.—Fricks reports that "typhoid infection among Arizona Indians is extremely rare. There was no evidence of typhoid infection having developed or spread on any reservation. Three cases of typhoid fever were seen, all in Indians, off the reservations, and nine cases were reported during the year away from the reservations, either in school or at work in and around Globe, Winkleman, or Needles."

Of the 32 deaths from typhoid fever reported in Arizona during 1911 only 1 occurred in an Indian, while over 21 per cent of the population of Arizona belong to that race.

California, Nevada, Oregon.—Typhoid fever seems very infrequent among the Indians in these States. According to Billings, 10 cases with 4 deaths were found in the records, for the past 20 years, of the Klamath Lake (Oregon) Reservation; 7 cases with no deaths in the past 15 years at the Western Shoshone (Nevada) Reservation; and 30 cases with 2 deaths in the last 20 years at the Round Valley (California) Reservation. Billings met with no case of the disease in the course of his inspections.

Colorado and New Mexico.—In commenting upon the sanitary conditions among the Zuni Indians, Smith states that "it seems inconceivable that this pueblo can long escape an epidemic of this disease." Though there is no reason to suppose that the Indian is immune to typhoid fever, yet he met with no case of this infection either in this pueblo or on the other reservations visited by him in these two States, although one case was recorded in the Cochiti pueblo in the last two years.

Idaho and Washington.—No case of typhoid fever is reported by Lloyd among the Indians he examined.

Michigan, Minnesota, and Wisconsin.—According to Clark, typhoid fever does not prevail to any extent among the Indians of Minnesota and Wisconsin, although cases of the disease do occasionally occur among the Indians of the Mackinac Agency. The source of infection is the city water supply. The Indians, however, are infected in no greater proportion than the white population. Some years ago an outbreak took place among the Indians of the La Pointe Agency at Odanah, Wis. The origin of these cases seemed to be derived from contamination of wells by the frequent overflows of Bad River. Since deep wells have been bored typhoid fever has disappeared from among these Indians.

Montana.—Typhoid fever seems to be as infrequent among the Indians of this State as in other States. White found records of one small outbreak only, in 1910, at Polson, on the Flathead Reservation. Polson in an incorporated town under the jurisdiction of the State.

He points out, however, that reservations are likely to become infected from outbreaks in such towns, as Indians frequently visit them for trading purposes.

New York.—According to Leake, typhoid fever is less prevalent among the Indians of New York than among the white population of that State.

North and South Dakota.—Schereschewsky and Preble report that at none of the reservations and schools visited were the morbidity records sufficiently complete to determine the general incidence of this disease among the Indians of these States.

One case was recorded for the fiscal year of 1912; 4 cases during 1911; 9 cases during 1910; 1 case in 1902; and 11 cases in 1879. Preble states that 4 cases of typhoid infection occurred in 1910 on the Lower Brulé Reservation, which is situated a few miles above the Crow Creek Reservation on the Missouri River. In the same year 3 cases were recorded at Crow Creek. As the Missouri River is generally used by the Indians for drinking purposes, it is possible that the Crow Creek cases might have been due to pollution of the river from the cases at Lower Brulé.

On the whole, despite the current impression that the Indian is very subject to the inroads of contagious and infectious diseases of every description, it would seem, as a result of these investigations, that, despite conditions apparently favoring its spread, typhoid fever must be regarded as a disease of uncommon occurrence among the Indian population of the United States. This seeming immunity is probably due to the fact that the disease has not as yet been extensively introduced among them.

It is further pointed out by Schereschewsky and Preble that the Indians' water supply is comparatively safe. Indians draw their drinking water from any palatable source, such as rivers, creeks, slews, etc. Among civilized communities such sources are much exposed to pollution. Owing to the fact, however, that the Indian is fond of living on an eminence, he rarely builds his house in close proximity to his source of drinking water. By reason also of the low density of population on Indian reservations and, in many localities, to the impermeability of the subsoil and scant annual rainfall, the opportunities for the pollution of these sources of water supply through seepage and surface washings seem to be remote.

The Indian also either does not drink milk or his supply is consumed only by his immediate family. This important cause of the dissemination of typhoid fever among the white population, i. e., through the agency of milk, is therefore not operative amongst the Indians. It may be expected, however, when the Indian is brought into closer contact with white populations that typhoid fever will become increasingly prevalent in the Indian race.

MEASLES.

The propagation of measles is favored by the conditions which obtain in boarding schools and on Indian reservations, hence outbreaks of this disease are common among the Indians. In some instances such outbreaks have been attended with a very considerable mortality.

In 1912 there was an epidemic of measles among the Jicarilla Apaches (New Mexico), with 15 deaths directly due to the disease and 21 from its immediate complications, a mortality rate of 20.4 per cent. In the same year a severe epidemic of 577 cases took place among the Zuni Indians, with 123 deaths, a mortality rate of 21.5 per cent. It is worthy of note that at the time of this epidemic 80 additional cases without a death occurred among the inmates of the boarding school on this reservation. The high mortality affecting the Indians on the reservation is ascribed by Smith to "the malpractice and opposition of the Indian medicine men." It is stated that their idea of the treatment of this disease is to cause a severe inflammation of the rectum by means of violent and repeated digital manipulations.

In the pueblos of Laguna, Paraje, Seama, Encinal, Paquate, and Mesite, N. Mex., a total population of 1,500, together with the Acoma pueblos, out of 140 deaths in the past five years, 19, or 13.57 per cent, were due to measles.

Fricks states that several epidemics of measles prevailed on five of the Arizona reservations within the past two years with a high mortality among children from pneumonia as a complication.

On the other hand, records of measles outbreaks with a very low mortality were found among agency morbidity reports. Four hundred and twenty-eight cases occurred at the Salem (Oreg.) school within the past 8 years with but 1 death, 164 cases with no deaths on the Klamath (Oreg.) Reservation, and 244 cases with no deaths on the Round Valley (Cal.) Reservation, all within the past 20 years.

In North Dakota an epidemic of 90 cases occurred at the Standing Rock Agency and Industrial School with no deaths. There were widespread outbreaks on the Sisseton (S. Dak.) Reservation in 1894 and again in 1904 with no immediate mortality. In 1911 there were 45 cases at the Cheyenne River Agency School, with 119 cases on the reservation.

It would appear from the foregoing that, while measles is widely prevalent among the Indians, the type of the disease in the Northwest is milder than that in the Southwest.

SCARLET FEVER.

The consensus of opinion among Indian physicians is that scarlet fever is decidedly rare among Indians. One case of the disease was encountered at Rosebud, S. Dak., by the officers engaged in this investigation.

An outbreak of 45 cases of scarlet fever took place in the Fort Defiance boarding school in May and June, 1911. The disease was mild in type and no deaths resulted. A record of 7 cases of scarlet fever was also found at the Lower Brulé Agency School from October 10 to November 13, 1912. The cases were mild, effectively quarantined, and there was no further spread of the disease.

DIPHTHERIA.

No cases of this disease were encountered by any of the officers engaged in the work of investigation. No data of any value as to its prevalence could be collected. It is the opinion of agency physicians that the disease is infrequently met with among Indians. At all events, it is very infrequently noted on the agency morbidity reports. Nineteen cases of diphtheria were noted as having occurred among the Mescalero Apache Indians during the two years ending June 30, 1912.

WHOOPING COUGH.

Whooping cough is common among the Indians, though probably less so than among the whites, owing to the low density per square mile of the Indian population. In infants it is attended with the usual high mortality.

CHICKENPOX AND MUMPS.

These contagious diseases are common among the Indians but are unattended with any mortality. The frequent occurrence of chickenpox emphasizes the necessity for continuing the thorough practice of vaccination among the Indians, as through confusion with this disease, smallpox might exist for a time among a community inadequately protected by vaccination without recognition, thus greatly increasing the difficulties of eradicating the disease.

EPIDEMIC CEREBROSPINAL MENINGITIS.

Guthrie reports that in an epidemic of cerebrospinal meningitis prevalent in Oklahoma from December, 1911, to May, 1912, consisting of 902 cases with 509 deaths, 17 or 18 of these cases were in the persons of Indians. Five of these cases, with two deaths, occurred in the Cheyenne and Arapaho School at Lawton.

INFANTILE PARALYSIS.

The occurrence of cases of infantile paralysis was reported on the Flathead and Blackfeet (Montana) Reservations in 1911. White points out that the prevalence of flies on reservations and their easy access to houses and tents, constitute conditions favorable for an epidemic of this disease, in the light of our recently acquired knowledge of the rôle possibly played by the stable fly in the transmission of this infection.

MALARIA.

Malaria is encountered among the Indians in those sections of the country favorable to the breeding of the malaria mosquito (Anopheles). The majority of Indian reservations, however, are located in regions where this mosquito is rarely met with. This is fortunate, as owing to the use of tents and unscreened houses Indians would be prone to suffer severely from the disease.

Guthrie states that malaria is prevalent among Indians in the southern and eastern parts of Oklahoma. The Indians of this section suffer in about the same ratio as do the whites.

VENEREAL DISEASES.

Contrary to the general impression, but little evidence of any extended prevalence of venereal diseases was found among the Indians by the officers engaged in this investigation. It is probable that the majority of cases thought to be syphilis by laymen are nothing more than impetigo, a cutaneous affection common among Indian children.

The parasyphilitic diseases, general paralysis, and locomotor ataxia are rare among the Indians, thus arguing against any extensive prevalence of syphilis. Further corroboration of the infrequency of this disorder is furnished by the rarity of spontaneous abortions or miscarriages among Indian women. Maternal syphilis is a frequent cause of such accidents.

Gonorrhea is also uncommon. The agency morbidity reports contain but very few references to this disease and the continuing high birth rate among the Indians is internal evidence as to the rarity of this affection with its well-known tendency to cause sterility or to reduce fertility.

CONTAGIOUS SKIN DISEASES.

The careless personal habits and lack of bodily cleanliness of Indians favor the spread of contagious skin affections. Scabies or "itch" is very common and impetigo contagiosa, a usually innocent but unsightly skin disease, is widely prevalent among Indian children. Eczema of the face and scalp, due to the irritation of head lice, is frequently encountered.

HOOKWORM.

In common with the poor white mountaineers of North Carolina, the Cherokees of that State suffer from hookworm infection. In 1911, 41 per cent of the children examined in the Cherokee boarding school were found to be infected with hookworms.

OTHER INTESTINAL PARASITES.

Besides hookworm, infection with other intestinal parasites, such as the tapeworm and the roundworm, is very common among the Indians.

GOITER.

While goiter, or enlargement of the thyroid gland, is not, of course, an infectious disease, cases of this affection of the thyroid were met with so frequently among the Indians examined as to excite comment among the officers engaged in this investigation.

Among the Shoshones and Arapahoes on the Wind River Reservation in central Wyoming, Herring found many goitrous persons. About 25 cases were seen in a little over 100 Indians examined, and in the Shoshone School out of 108 children examined 21 cases of goiter were found. Goiter was reported by Schereschewsky to be of common occurrence on the Standing Rock Reservation in North Dakota, and Pine Ridge and Rosebud Reservations in South Dakota, and by Clark in Michigan and Wisconsin.

ROCKY MOUNTAIN SPOTTED FEVER.

Dr. Herring states that on the Wind River Reservation one case of Rocky Mountain spotted fever was also reported in a young adult female Indian. Cases of this disease are reported annually among the white residents in this section during the tick season. The disease here is mild.

INSANITARY CONDITIONS AMONG THE INDIANS, AND THEIR BEARING UPON THE PREVALENCE OF INFECTIOUS AND CONTAGIOUS DISEASE.

In considering the insanitary conditions which account for the high prevalence of infectious and contagious disease among the Indians it will be proper to consider, in order, (1) climatic influences, (2) housing conditions, (3) personal and social habits and customs. (4) diet, and (5) insanitary conditions in schools.

CLIMATIC INFLUENCES.

Generally speaking, Indians inhabit healthful sections of the United States. Only a small portion of the Indian population is domiciled in areas infected with the malaria mosquito. The larger area comprised in Indian reservations is situated where the soil is fertile, the elevation high, and the percentage of sunny days great throughout the year.

Dust.—The scanty annual rainfall, however, common to the reservations of the northwest (the Dakotas, Montana), and the southwest (Arizona, Colorado, Nevada, and New Mexico) together with the general prevalence of high winds over the entire extent of this territory, lead to the occurrence of dust storms in which great clouds of matter are driven with high velocity. To the irritation of this dust may be partly ascribed the frequency with which inflammations of the conjunctiva, other than trachoma, are met with among Indians, and the irritation of the dust may also place the eye in a condition receptive to trachomatous infection. Moreover, the inhalation of dusty air may also increase the susceptibility to pulmonary disease by reason of the irritation set up in the respiratory tract by the suspended foreign particles.

Sunlight.—Excessive amounts of sunlight impose a certain strain upon the eyes. Many Indians were seen whose eyes were sensitive to light and who sought to protect their eyes by the use of colored goggles. This sensitiveness of the eyes, caused by undue or prolonged exposure to brilliant light, causes watering, with discomfort in the eyes, thus leading to frequent rubbing of the eyes with the fingers. This renders the transfer of infection from fingers to eyes easy, and it will be seen later how often the hands of the Indian are likely to be soiled with the germs of disease. The frequent occurrence among the Indians of pterygium, a fleshy growth, starting usually from the inner corner of the eye, and believed to be caused by exposure to excessive light, is additional evidence as to the irritating effects of brilliant sunshine.

Cold weather.—The severity and long duration of the winter weather in the northern reservations is a factor in the propagation of disease, for the Indian, in his effort to keep warm, remains indoors as much as possible during the cold weather. He not only reduces, in this manner, his resistance to disease by breathing, through long periods, the vitiated atmosphere of his usually crowded cabin, but the opportunities for acquiring infection are multiplied by reason of the intimate personal contacts inseparable from such conditions.

Beyond the conditions just mentioned, however, climate may be said to play but little part in the incidence noted among the Indians of infectious and contagious disease; and in order to estimate the comparative effect on Indians of such conditions it would be necessary to examine the whites living under like circumstances.

HOUSING CONDITIONS.

Prior to the subjugation of the Indians by white men, they enjoyed an open-air, roving life, living in well-ventilated tepees,[1] which were frequently moved from place to place. While in the uncivilized state their habits, it is true, were insanitary, the evil effects were undoubtedly minimized by the frequent moving of camps. It is also probable that in the early days the custom of leaving behind those unable to travel by reason of disease or physical disability may have had the effect of reducing the prevalence of disease.

From this roving life, however, Indians have been confined to reservations since about the middle of the nineteenth century, and taught to live in more permanent abodes. They are still generally ignorant, nevertheless, of those elementary principles of domestic hygiene and their practical application, rendered imperative by the adoption of a stationary home. It is necessary to state, of course, that this does not apply to all Indians, many being met who are of unusual intelligence and whose sanitary habits are good.

The house and the domestic life of the Indian undoubtedly play the most important rôle in the perpetuation and spread of infectious and contagious diseases among them. The more primitive the Indian, the less care is there exercised in the construction of his house, and the more filthy its condition and that of its surroundings. According to figures furnished by the Indian Office, there are 17, 188 Indian families living in permanent houses with floors, 9,201 families in houses with dirt floors, and 9,582 families living in tents, tepees, etc.

The typical Indian house of the North and Northwest is usually a small one-story frame or log structure with a common living room in which the family does its cooking, receives visitors, and sleeps. In the case of the log cabins the chinks are puddled with clay, and earth or manure is frequently banked around the house in the winter to exclude the cold. The roof in log cabins is usually made of sod laid upon poles. The floor too often consists of dirt although, from the figures above quoted, it will be seen that nearly one-half the families live in floored houses.

The windows are generally small, and in log houses placed at either end of the living room. This disposition would favor thorough ventilation were the windows kept open, but they are frequently nailed shut.

On many of the Indian reservations a number of well-constructed houses exist, put up, under Government supervision, with funds derived by Indians from the sale of inherited lands, etc. And on the New York reservations the home of the Indian compares favorably with white rural dwellings. In spite of the more commodious quarters the tendency of the Indian family to huddle together is manifest in these houses, the family occupying but one room and leaving the rest of the house uninhabited. Indian habitations peculiar to the

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[1] The Pueblo and Hopi Indians of Arizona and New Mexico have been house dwellers, however, for generations.

Southwest are the "hogan" used by the Navajos, the grass huts of the Apaches, and the houses used by the Hopis and the Pueblo Indians.

The "hogan".—The "hogan" of the Navajo varies in size but is commonly about 20 feet in diameter. It is built above the ground, but its sloping timber sides and flat or conical roof are covered with dirt. No window is provided, but in the center of the roof is a large smoke hole, usually about 5 feet in diameter, for which no provision is made for closing. Ventilation of this house, therefore, is by no means bad, as there is commonly a fire burning in the center of the dirt floor and around this members of the household eat and sleep.

Apache tepees.—The Apaches commonly live in huts or "tepees" made of arrow grass. No windows are provided and the ventilation is defective. These tepees, however, are burnt up by the Indians on the occurrence of death in the family, and, owing to the ease with which they are constructed, the Apache frequently changes the location of his home.

House of Pueblos.—The Pueblo Indian has been a house dweller for generations. The houses among the Zuni are of adobe and each is usually a part of the large community dwelling of which the pueblo is composed. The houses usually consist of one large living room, with a characteristic rounded fireplace and projecting wind shield. The interiors are all whitewashed and the windows of the living room large, but usually opening at one end only.

Adjoining this large room are numerous small interior apartments, very poorly lighted, usually from one small window placed high up in the wall. These rooms are usually granaries and storerooms, but some of them are used as sleeping apartments. The family eats and sleeps upon the floor, usually that of the largest room, rolling their pallets up in the morning and stacking them around the sides of the apartment, or carrying them into an inner room, to remain during the day. The floors of these houses are frequently made of flat stones, carefully laid, but often of adobe which is frequently renewed.

These Indians are neat when compared with the nomadic tribes. There is little disorder or litter among their household chattels, such as is found among those tribes which have lived in houses only of recent years.

The defensive instinct, still strong in the Indian, leads the Pueblo Indian frequently to locate his dwelling in inaccessible places on hills, and to enter it through a hole in the roof by means of a ladder.

Summer residences.—In the summer time many Indians live in tents or dwell in shelters constructed of brush. The tent may be of canvas stretched on lodgepoles in the usual conical shape or the ordinary wall tent may be employed. These tents are frequently occupied in the Northwest until well into the winter. Under such circumstances a cookstove is usually installed in the tent and the flaps closely tied in order to exclude the cold. As duck is wind proof, the ventilation under such circumstances leaves much to be desired.

Overcrowding.—Owing to the high birthrate among the Indians the average family consists of 4 or 5 individuals. It is no unusual sight to see 8 or 10 individuals living in one small dwelling. The tendency of Indian families to huddle together, even in commodious quarters, has already been adverted to. The following graphic description of Preble's gives an excellent idea of conditions too frequently met with on Indian reservations and the opportunities for the transfer of infection which overcrowding affords:

> In one such house, a well-built two-room framed building about six months old, eight individuals were found living and sleeping in one small room about 12 by 14 feet. Three of these people were between 8 months and 3 years of age. An apology for a bed occupied one side of the room and on it sat a young mother holding a 3-year-old girl suffering from advanced tuberculosis. In the center of this room was a worn-out cookstove, giving off great quantities of heat and foul odors. The air in the room was stifling. On the other side of the room, two women, about 30 years of age, were sitting on a number of extremely filthy rags and hides, both nearly blind as the result of acute trachoma. One was nursing an 8-months-old baby and, when an examination of their eyes was attempted, this mother wiped the discharges from her own eyes with her fingers and then attempted to assist in opening her baby's eyes for examination.

Interior of houses.—Generally speaking, especially in the north and northwest, the interior furnishings of Indian houses may vary from a few rags and dirty hides on the floor, with a stove of some kind for heating and cooking, to the articles necessary to a fairly well furnished room. Some houses are so crowded with a miscellaneous collection of articles, useful or otherwise, as to leave but little room for human occupancy. From observations made it is apparent that rare attempts at cleansing are made in and about Indian houses, and many varieties of dirt and refuse may be seen in their homes.

The Indians sleep either on the floor or in beds. Bed linen is of course conspicuous by its absence among the primitive Indians, and the bedding consists of a miscellaneous collection of quilts, blankets, and skins, often very filthy.

Towels are but little in use, any convenient cloth serving instead, and where present they are used in common by all the members of the family. But one hand basin at most is provided for washing purposes, and like the towel is used indiscriminately.

PERSONAL AND SOCIAL HABITS AND CUSTOMS.

Personal cleanliness.—Personal cleanliness among primitive Indians, especially the older full-bloods, is rarely encountered. They are said to wear the same clothing until it is worn out, and in cold climates it is safe to assume that it is seldom removed. During the warm weather many Indians bathe and wash their clothing simultaneously by squatting in shallow creeks. Even in this attempt at personal cleanliness the clothing may not be removed from the body.

While doubtless many Indians take a certain pride in their personal appearance, it may be safely stated that the majority are unacquainted with methods of personal hygiene. The habits of the younger generation, and especially the mixed-bloods, are, as a rule, less unhygienic. Those attending the boarding schools and day schools are under supervision, and personal cleanliness is more or less compulsory.

In addition to want of cleanliness, the Indian is very careless in other personal habits. Secretions from the nose and eyes are commonly removed with the fingers, which are not subsequently cleansed. It was a frequent experience, reported by the officers engaged in this investigation, to see a mother, afflicted with trachoma, removing secretions from her eyes with her fingers and then performing a similar function for her child. If a handkerchief was used for the purpose it was usually in a filthy condition and used in common with the mother and the child.

The Indians are very careless about expectorating freely on the dirt floors and at most covering the sputum with a pinch of dirt. It is inevitable that the dirt floor of huts inhabited by tuberculous Indians must in time become heavily infected with the tubercle bacillus.

Among primitive Indians urine and feces are deposited in some secluded spot wherever the individual happens to be, and among the more advanced Indians the privies in use are of unsanitary construction, and many readily serve as breeding places for flies.

Once attacked by disease the stoicism and indifference of the Indian leads him to defer seeking medical relief until it is too late, as he is usually ignorant of the serious nature of his disorder, and his indifferent nature prompts him to wait in the expectation that the cause of his suffering will presently disappear and a return to health ensue. If he does seek medical aid he expects to be cured by one or two doses of medicine, and if this expectation be not realized he is apt to seek a "medicine man" for relief.

Social habits.—The Indians are a sociable race, extremely fond of visiting each other. Many of the Indians pass a great deal of their time on rounds of visits. Houses, overcrowded by the number of their usual occupants, frequently have their scanty accommodations further strained by the advent of visitors who may stay days or even weeks. The practice among Indians of loaning children to each other for long visits is of common occurrence. The opportunities this habit affords for the introduction of diseases, such as trachoma, into uninfected families is only too obvious.

The Indian having lived for generations under communistic conditions, still regards property as belonging to the tribe and not to the individual, hence pipes, articles of wearing apparel, bedclothing, and the like are freely interchanged, thus facilitating the transmission of communicable disease.

The habit of "passing the pipe" in gatherings is doubtless sometimes responsible for the transference of disease, as well as their custom, in rolling cigarettes, of closing the tobacco bag by drawing the string with the teeth before passing it to the next individual.

Indians are fond of gatherings of every description. On the days rations are issued, and during the summer, many families gather at the agency for rations or near the day schools in order to be near their children. These temporary gatherings and their various fairs offer them an opportunity for visiting, and may exert considerable influence in the spread of any communicable disease that may exist among them.

Dance halls.—The custom among the Indians of holding dances prevails to a considerable extent on many of the reservations visited. One of these dances is held usually after each ration day. The issuing of rations is an occasion which brings together the aged and infirm, those incapacitated by disease and unable to provide for themselves, and they are usually accompanied by their families.

The dance halls are usually single room, old frame or log buildings, about 30 by 50 feet, often with dirt floors. The Indians crowd into these halls and spend a night of dancing and feasting. The rations which are to last some Indians for a month are soon eaten by their friends, leaving them to fend off starvation as best they can until next ration day.

These dances offer many opportunities for intimate personal contact among the sick and the well. Besides ration day dances, other dances are held at varying periods. Notice of a dance spreads rapidly among the Indians, and whenever some member of the tribe contributes provisions sufficient for a feast a dance is held. Many of the more intelligent and better educated Indians recognize the harm wrought by the dances upon the health of the participants and deprecate the custom.

Singing gatherings.—Besides the dances just mentioned, another custom which brings varying numbers of Indians together is that of holding "singings" at Indian houses. Whenever sufficient food of any kind is provided by some Indian, word goes out among his friends and they gather at his house and spend a night of singing and feasting. The same conditions favoring the spread of trachoma, tuberculosis, and other affections exist as in the dance halls. Many superintendents have prohibited these gatherings, but they continue to be held in some localities.

All these customs which bring together a large number of Indians of all ages, both the sick and the well, must be factors in the spread of trachoma, tuberculosis, and other infectious and contagious disorders.

"*Medicine men.*"—The Indian medicine man is still altogether too influential among the Indians. The adoption of a more sanitary mode of life and a greater utilization of the medical facilities and knowledge of the white race, on the part of the Indian, would naturally have the effect of destroying the medicine man's prestige. As a consequence he opposes the introduction of sanitation and resists, so far as in him lies, the spread of modern doctrines as to the origin and dissemination of disease and their proper treatment among the Indians. Moreover, in many instances, his own efforts at the treatment of the sick have the effect of propagating, rather than limiting, infection.

Flies.—Many of the reservations were visited after the onset of cold weather. It was, therefore, impracticable in numerous instances to determine the prevalence of flies by direct observation. At the reservations visited where the weather was still mild, officers engaged in this investigation reported flies to be a veritable pest, and it was obvious, on other reservations, that conditions were very favorable for their propagation. The potentiality of the fly as a disseminator of contagious and infectious diseases has been the subject of much discussion of recent years. The agency of the fly as a possible factor in the transmission of trachoma and tuberculosis has been admitted, and, in the Orient, the fly is believed to be an active agent in the spread of the former disease. Flies are attracted to bodily discharges of all kinds and are frequently seen swarming about the faces of those afflicted with diseased eyes.

Recently, also, it has been shown that the stable fly may be an agent in the transmission of infantile paralysis. Indian reservations contain many stables and temporary shelters for horses and cattle. These are usually maintained in a filthy condition and can not fail to furnish favorable breeding places for the stable fly.

DIET.

While naturally robust, owing to his indifferent nature, his improvidence, and his aversion to agricultural pursuits, the Indian, as a race, is rather under than over nourished. His dietary regimen is marked by periods of repletion when he is in funds and of abstinence when the larder is low. He takes but little advantage of present plenty to provide for future want, and, owing to his hospitable nature, his provisions, while they last, are freely at the disposal of his friends.

Much of the food eaten by the Indian is of poor quality and poorly prepared. They are meat eaters by preference, and meat is eaten whenever it can be obtained. Owing to their poverty and their habit of killing and eating their cattle instead of breeding them, they are often obliged to go for long periods without meat, subsisting for the most part on coffee, baking-powder biscuit or fried bread, and whatever else they may be able to obtain.

It is probable that the inferior diet of the Indian plays some part in the prevalence of disease among them by lowering his vital resistance.

Use of alcoholic beverages.—The craving of the Indian for alcoholic stimulants is well known to have a pernicious effect upon the race. The use of alcohol diminishes the resistance to disease, augments carelessness and indolence, and causes the Indian to expend money which had far better be used for nutritious food.

SCHOOLS.

There are certain conditions observed in the Indian schools which have a bearing more or less direct on the propagation and spread of contagious and infectious diseases among the Indians.

Conditions inherent in institutional life.—In any boarding school, Indian or otherwise, it is obvious that plentiful opportunity exists, by reason of intimate personal contact, for the propagation of contagious and infectious diseases. It is evident in Indian schools, dealing as they do with a population primarily affected with an undue prevalence of tuberculosis and trachoma, that, unless the greatest vigilence be exercised, many instances of the transfer of infection from one inmate to another are bound to occur. It has already been pointed out, in the case of nonreservation boarding schools, that they may be the means of implanting trachoma in areas where, at present, it does not exist, or at most is but slightly prevalent.

Fricks states, with reference to an Arizona boarding school, that, according to the agency superintendent, of all the pupils, 249 in number, leaving the agency boarding school within the past 10 years, 33.74 per cent are now dead from tuberculosis, and further, owing to the incomplete record of deaths between 1904 and 1910, that the percentage found is probably much lower than it actually is. It is probable in this instance, however, aside from the acquisition by the children of tuberculosis from other inmates in infected dormitories, classrooms, and the like, that the change from the nomadic life of their tribe to that of the school was too great. Smith points out that the regular hours of work and study, the irksomeness of the labor required from school children, while light, is nevertheless a greater tax upon the physical capacity of the Indian child than the hardship of the indolent camp life to which he is inured.

Overcrowding and ventilation.—The majority of Indian boarding schools seem crowded beyond their capacity, or, owing to dispro-proportionate numbers of the sexes, while the total enrollment may be below the rated capacity of the school, the dormitories for one sex may be overflowing while ample room may exist for the other.

The regulations of the Indian Office allow a minimum of 500 cubic feet of air space per pupil in the dormitories. This air space is sufficient in the presence of adequate ventilation. Most of the dormitories are supplied with enough window space to afford proper ventilation if the windows are kept open. It is obviously impracticable, however, in severe winter weather adequately to ventilate some of these dormitories during the night by natural means, with the present air space allowed. At all events, chronic nasopharyngitis and enlarged tonsils and adenoids are too frequently observed among the pupils in Indian boarding schools and serve as mute evidence of an inadequate or incorrectly moistened air supply.

Washing facilities.—With a view of limiting the spread of trachoma among the pupils of Indian boarding schools, the regulations of the Indian Office provide for running water for washing and separate towels for the pupils. It was found, however, that while separate towels are provided the washing arrangements are on the whole inadequate or defective, and the advantage of providing separate towels was in most instances nullified by the manner of their disposition when not in use.

The towels are generally hung up by loops at their corners upon rows of nails, marked with the pupil's number or name. These nails are so closely spaced that the towels overlap each other, and thus provide opportunity for the transference of infection from one towel to another. In some of the schools, however, the "Pullman" system of separate towels is used.

In most of the schools facilities for washing in running water are provided. The arrangements to this end, however, may be criticized from the standpoint of inadequacy and also because the faucets are of the usual pattern instead of the pedal variety. Ordinary bar soap is provided instead of liquid soap or soap powder in sanitary containers. In other schools set bowls, or even the ordinary hand basin, are still in use, the bowls and washbasins being inadequate for the number of pupils and, in the case of washbasins, being kept nested when not in use.

Tubs, instead of shower bath, are still in use in most schools for bathing purposes. It is plain that the tub used in common by large numbers of individuals, and difficult to cleanse owing to the hardness of the water at many Indian reservations, may be a factor in the spread of infectious and contagious diseases.

Toilet facilities.—The plumbing fixtures in many of the Indian schools are of obsolete pattern, located in damp and dark basements and often in a state of disrepair. At some of the schools the ordinary outdoor insanitary privy is still in evidence and serves as the breeding place of numerous flies in the summer.

Water supply.—The water supply at some of the schools is inadequate, and instances have been noted where a supply primarily sufficient was rendered either unsightly or insufficient through defects in well casings, leaks in supply pipes, etc.

The importance of an adequate water supply for washing and laundry purposes, the maintenance of water-closets and urinals in a sanitary condition by proper flushing and for fire protection can not be overestimated.

The common drinking cup.—The common drinking cup is too frequently seen in Indian schools. Sanitary bubble fountains, however, are being gradually introduced.

Flies.—The Indian boarding schools are inadequately protected against flies. The dining rooms and kitchens are usually screened but not the dormitories and class rooms. Allusion has already been made to the fly as a factor in the spread of disease.

Sanitary supervision.—The sanitary supervision of pupils in many Indian schools leaves much to be desired. Pupils suffering from trachoma are allowed freely to mingle with the others in the class rooms, at play, and in the dormitories in most of the schools visited. Tuberculous pupils in most instances are sent home when detected, but the frequency with which such conditions are early discovered depends more or less upon the character of medical supervision exercised.

Where the superintendents of schools are physicians, such supervision is more complete. On the other hand, when no medical supervision is provided, or the medical attendant is a contract or an agency physician, there is room for much improvement. The contract physician is usually too busy with his private practice to pay much attention to the school, and the calls on the agency physician, which frequently take him to distant parts of the reservation, prevent his devoting sufficient time to the pupils.

Gymnasium playrooms.—In the colder climates some provision for indoor physical exercise is necessary to the maintenance of health in the Indian boarding schools. Gymnasiums and well-lighted and ventilated playrooms are therefore necessities to this end. In the majority of Indian schools no gymnasiums are provided, and the playrooms are too apt to be situated in comparatively dark and poorly ventilated basements.

From the foregoing it is evident that sanitary conditions among the Indians are generally unsatisfactory and that the schools which are one of the most important agencies existing for the advancement of the Indians are also capable of improvement from a sanitary standpoint. It is necessary to state, however, that there were evidences of recent systematic efforts to improve these conditions. The extent of improvements are, of course, largely dependent on available funds.

The Bearing of the Prevalence of Contagious and Infectious Diseases Among the Indians on the Health of Other Races.

The presence of considerable numbers of Indians on reservations in many States, the gradual opening up of portions of these reservations to white settlers, and the consequent increase of communication between the two races, renders pertinent in this report some consideration of the bearing of the prevalence of contagious and infectious diseases among Indians on the health of other races.

In a previous official report Clark referred to the prevalence of trachoma and tuberculosis among the Indians of Minnesota and the possibility of the spread of these diseases to the surrounding white population. In an examination of 1,428 public school children in counties adjacent to Indian reservations, he found but 3 cases of trachoma and these among 77 Indian children of mixed parentage who were enrolled in these schools.

With the allotment of lands and further opening of reservations to white settlers, increased opportunity will be afforded for a more intimate commingling of the races. In the course of time, counties will be organized within many of those reservations and public schools established for the use of children of the two races. The intimate contact during school life will thus afford a greater opportunity for the spread of disease from one to the other than is now the case.

A considerable number of Indian children now attend the public schools of Michigan and Wisconsin. The prevalence of trachoma and tuberculosis among the Indians of these two States may be a source of infection to the school population, and furnishes a problem worthy of careful consideration by the proper authorities.

The introduction of railways is bringing the Indian into closer contact with the white population and opens a channel through which communicable diseases may be spread by them. It is well known that Indians are fond of travel and make long journeys to visit allied or kindred tribes, and diseases among them may easily be spread to others in the course of such journeys.

Fricks reports the closure of the public schools of Bisbie, Ariz., during the past year because of an outbreak of trachoma, and that the disease is common, according to report, among Mexican school children in and around Phoenix. In one school he examined 30 pupils and found 3 cases of trachoma, one in an American child and two in Mexican children, a brother and sister. He considers the Walapais of Arizona a menace to the public health because they dwell in insanitary hovels at various points along the Santa Fe Railroad. Among these Indians he found a tuberculosis case incidence of 76.9 per 1,000 in those examined.

Schereschewsky cites the Turtle Mountain Reservation, N. Dak., as "a striking instance of the way in which a destructive disease (trachoma) now more or less closely confined to a resricted area, is about to be implanted in another section of the country. This reservation is situated in the northern part of North Dakota. Its area is small, approximately 30 square miles * * *. Only a portion of this small reservation consists of arable land, so it is manifestly impossible to allot land to these Indians on their own reservation. As a result, they are being allotted land out of the public lands in Montana, and thus are in the process of being dispersed from their original reservation."

It has previously been stated that only two cases of trachoma were found among the 943 Indians examined in New York, and that these two cases had probably contracted their infection at a nonreservation boarding school in another State. The Indians of New York have manifestly had the greatest opportunity of any Indians in the United States for association with persons of foreign birth, and Leake states that numbers of them have been employed on construction works in association with immigrants from southern Europe. It would appear from this that, in view of present precautions, the danger now is not so much the transmission of contagious and infectious diseases from immigrants to inhabitants of the United States, but from Indians to immigrants settling on lands in the West. There is evidence for instance that, since the inauguration of measures in 1897 by the Government to exclude trachoma from among arriving immigrants, the disease has decreased in some eastern cities. In isolated interior localities, on the other hand, the disease has now been shown to be endemic for years and increasing.

The control of communicable diseases among Indians and the prevention of their spread to other races is, therefore, indicated as a public health measure.

THE MEDICAL BRANCH OF THE OFFICE OF INDIAN AFFAIRS.

The prevalence of contagious and infectious diseases among the Indian population may in some degree be influenced by the measures taken to cure cases of those diseases, but in far greater degree by the observance of hygienic habits by the Indians themselves. During this investigation opportunity was afforded for observations of conditions militating against the successful treatment of diseased individuals themselves and also of conditions preventing the improvement of sanitation among the Indians.

The relief of suffering and the cure of disease are necessary, and provisions made to this end are commendable, but under present conditions their application is discouraging and does not approach the problems of sanitation among the Indians. The curative effects aimed at, at the present time, by the physicians of the Office of Indian Affairs are largely nullified by the conditions under which the work is attempted and by the indifference of the primitive Indian and his ignorance of the first principles of hygienic living.

It was the common observation that many of the medical officers of the Office of Indian Affairs were working hard, but a great deal of this really hard work is wasted. In the following graphic manner Dr. Lloyd refers to conditions by asking a question and answering it:

> What is the matter? Let us visit an average doctor on an average reservation. We enter his office, which is reasonably well provided with drugs but not much else. Five minutes later Billy Blackhawk comes after the doctor and we consent to go with him. After a drive of 14 miles over bad roads, through rain and sleet we arrive, the doctor carrying his old-fashioned pill bags or medicine case containing a hatful of promiscuous drugs. We enter the house; in one room about 12 feet square live from 5 to 10 people; they sleep on dirty blankets or a pile of dirty rags strewed around on the floor, which is covered with grease and filth. They have a small stove in the center of the house, with a very little fire, because fuel is scarce and hard to get, or, if it is easy to get, as it frequently is, it is easier to keep the doors and windows closed than to chop wood. At any rate, all the doors and windows are closed to keep out the cold. It is now night, and from the dying embers in the stove and a well-smoked lantern there are emitted rays of light approximating in number half a candlepower. Dark as it is and cold, every time you move you can hear the flies buzzing as they are driven from their sleeping places. Indeed, some of them have not yet gone to bed and can be dimly seen crawling around over the nostrils and lips of the little sufferer whom the doctor has come to see. Let us look at the child. He is 5 years old, has had whooping cough for the past three weeks, and now has pneumonia. The poor little fellow is so dirty the doctor hates to touch him. On the same pile of rags is stretched his sister, 12 years old, in the last stages of consumption. If by some miracle the child should survive its present ailments, it would certainly die later of tuberculosis. Now, what can a doctor, though armed with all the drugs in the pharmacopœia,

do under such circumstances? The parents of the child do not know enough to give the remedies as they should be given; they do not know how to feed the child, and do not have the proper food for it if they did. Even if they could carry out the doctor's directions as to medicine (which is perhaps the least important part of the treatment) the doctor can not come every day, or even once a week, for that matter, and no doctor can see such a patient once and outline his course of treatment for the rest of the time that the child is going to be ill, and yet that is exactly what he tries to do. Being a physician, I took the liberty of asking the doctor how much good he thought he had accomplished by his visit. "None at all," he replied, "as you can readily see; the child will probably die; the father will conclude that the white doctor is no better than his own 'medicine man' and may never send for me again; and, in fact, the Indian in his peculiar surroundings can really die about as well without my aid as with it." I smiled grimly at this sally and the doctor sighed deeply. Just as we were leaving an Indian halted us to say that old lady Redeagle, who lived in the tepee across the creek, was also very sick. "And did she send for me?" asked the doctor. "No, but I thought maybe you might go to see her." We went. Now, a tepee is another name for the old-fashioned wigwam, still in existence, a kind of improvised tent with a dirt floor. A little fire of sticks burned low in the center, the smoke going out through the open space in the rounded top. We had to crawl on our hands and knees in order not to be stifled with smoke. There was no light except from the small fire. Bundled in a heap with head and ears covered lay an old creature evidently quite ill, but not too ill to show plainly that she resented our coming. An old man just aroused from his slumbers sat up and glared at us with sullen indifference. In spite of her protests, the doctor essayed to make an examination of his patient. After about a minute and a half he came away and said that it was probably either a case of dysentery or of typhoid fever and that was as near as he could guess. I have no doubt he was right, and I wondered how much his sense of smell had influenced him in making his diagnosis. As it was now very dark, the doctor lighted his lantern and we found our way to the creek. It rained on us all the way home.

This character of routine work has been going on, on many reservations, for years. The Indian is not benefited as his needs require; consequently he does not avail himself as fully as he might of the provisions for treatment of diseases. The physicians conducting the work on many of the reservations see no encouragement, their life is isolated, their pay small, their hope of promotion less, and their authority to attack the real problems limited. Under such conditions it would be surprising if any, except the genius, undertook to overcome the obstacles.

Governmental medical work must often be carried on in isolated localities and under adverse conditions, but among the other governmental medical corps the medical officers, by reason of definite organization and hope of advancement, are filled with enthusiasm and acquire and esprit de corps which is necessary to success in any great coordinated work.

The opportunities for aiding the Indian to the greatest extent must in future be sought in the prevention of disease and in educating him in the principles of right living. Herein the medical officer may find his greatest field of usefulness. It would appear that in the past the greater amount of attention has been paid by the Government to academic instruction and the protection of property rights, and that until recently little attention has been paid to advancing living conditions. Education of the Indian in sanitary matters will be a long and difficult process. Such education in greater degree is nevertheless necessary both in his interest and in the interest of the other races with which he comes in contact.

The health problems on reservations are in many respects similar to those in other isolated communities, and should be approached in like manner, i. e., by adequate local health administration. Coincident with educational work, laws or regulations are indicated, in so far as practicable, to compel the observance of sanitary measures. The Indian medical officer is, therefore, potentially, at least, a health officer, and in him should be lodged large powers, subordinate only to the central power at Washington.

Under existing regulation, agency physicians, in medical and sanitary matters, are subordinate to agency superintendents who are primarily interested in the preservation of Indian property rights, and who are not, in many instances, sufficiently impressed nor familiar with the importance of health matters.

By reason of the influence of insanitary conditions among the Indian population on the health of white citizens of the States, it is highly important to know promptly of the existence of contagious and infectious diseases among Indians. While it may not be practicable at present to learn of the presence of all cases of infectious and contagious diseases on reservations, outbreaks that do occur should be promptly reported to the chief State health authority in the State where the outbreak occurs in order that he may take adequate measures to protect those under his jurisdiction, and the same information should be communicated regularly to the Surgeon General of the United States Public Health Service, whose duty it is to notify adjoining States of the prevalence of contagious diseases and the occurrence of epidemics.

It was found that the records of sickness and deaths on most reservations were indefinite and fragmentary. This was believed to be due both to lack of a definite system of collecting such data and want of care in their preservation. The Federal Government is endeavoring to render more complete the reports of sickness and deaths throughout the country generally. These reports are the foundation of public health work, and the keeping of those relating to the wards of the Government should be as complete as possible.

The agency physician should be required to perform diligently the duties of a sanitary officer and should be held strictly responsible for the collection and preservation of these data and their transmission to the authorities mentioned.

Since the care of the Indian is largely the peculiar responsibility of the Federal Government, a careful study of the medical and sanitary needs on each reservation is indicated. In so far as practicable, uniform coordinated measures should be taken, and on reservations of wide area some additional facilities will undoubtedly be found to be necessary.

It is needless to say that such provisions should be made as will insure the services of medical men of great practical common sense and otherwise fitted for the work, and their retention by means of reasonable compensation.

SUMMARY.

In conformity with an act of Congress approved August 24, 1912, the United States Public Health Service made an investigation of the prevalence of contagious and infectious diseases among the Indians of the continental United States. The results of this investigation are summarized as follows:

The act above mentioned specified that a report should be made to Congress by February 1. Fourteen officers were accordingly assigned to the work, all of whom had had special training in inspection work and the diagnosis of trachoma.

The investigations consisted in examinations of available records at Indian agencies and boarding schools as to the past prevalence of contagious and infectious diseases, consideration of available records of State boards of health, examinations of Indians on reservations and in boarding schools, inspection of insanitary conditions having a bearing on the propagation of communicable disease, and house to house inspections upon as many reservations as possible.

The field investigations were begun September 28, 1912, and terminated December 30, 1912. Reservations and nonreservation boarding schools in 25 States were visited, and a total of 39,231 Indians examined, representing approximately one-eighth of the entire Indian population of the continental United States. It is believed that this number is sufficient to enable correct inferences to be drawn as to the prevalence among them of contagious and infectious diseases.

The examinations consisted in complete inspections of the eyes of each Indian seen for the existence of trachoma, supplemented by physical examinations for tuberculosis whenever indicated by the general appearance or the family history. In addition, the tuberculin (Von Pirquet) test was applied to 1,225 Indian children to ascertain the extent of tribal exposure, and a sufficient number of arms were examined to determine the thoroughness with which vaccination had been performed.

Attention was also paid to the sanitary conditions in schools and on reservations, with special relation to housing conditions, food supply, social and personal habits tending to favor the spread of disease among the Indian population. As a result of the examinations it became evident that trachoma and tuberculosis are veritable scourges of the Indian race, the former being the cause of much suffering, reduction of physical efficiency, and retardation of educational development by reason of damage to vision, and the latter bringing about destruction of the bodily tissues, crippling, and early death.

PREVALENCE OF TRACHOMA.

Out of 39,231 Indians examined at all the reservations and nonreservation boarding schools visited, 8,940 individuals, or 22.7 per cent, of the entire number were found to have trachoma. If the figures of the Indian Office, placing the total Indian population of the United States at 322,715, be accepted, it will be seen that, conservatively estimated, there are about 72,000 cases of trachoma in this class of the population, provided the rate computed from the examination be found generally to prevail. The persons examined were of both sexes, all ages, and may be taken to be representative of the general Indian population of the localities visited.

The incidence of trachoma was found to vary greatly in the different sections of the country and even in different parts of the same reservation. The highest percentage of incidence was found in Oklahoma, where 68.6 per cent of those examined were found to be trachomatous. In New York, on the other hand, only 2 or 0.2 per cent out of 943 Indians had the disease, and these 2 contracted the infection at a nonreservation boarding school. Other States which presented a high rate of trachoma infection were Wyoming with 51 per cent, Nebraska with 41 per cent, Utah with 39 per cent, Iowa with 32.04 per cent, Nevada with 26.9 per cent, Arizona with 24.9 per cent, North Dakota with 22.94 per cent, and New Mexico with 22.38 per cent, respectively.

Prevalence of trachoma in Indian boarding schools.—The prevalence of trachoma in Indian boarding schools was considered of great importance, as these may be generally regarded as one of the most important factors for the advancement of the Indian, in the general scheme of supervision devised for his benefit by the Federal Government.

The data collected from 133 such schools examined by the officers engaged in the work were collected and tabulated with the following results: Out of 16,470 pupils in Indian boarding schools, 4,916 cases of trachoma were found, or a general percentage of 29.86. The highest percentage found was reported at the Rainey Mountain School in Oklahoma where, out of 114 pupils examined, no less than 105, or 92.10 per cent, were found to be trachomatous, and the rate of trachoma prevalence in the Indian boarding schools of this State was found to be 69.13 per cent. Only 3 schools, 1 in Wisconsin and 2 in New York, were found free from trachoma, and this is accounted for by the fact that no trachoma was found in the Indian populations from which the inmates of these schools are drawn. In 68 of the schools visited trachoma was found in proportion of 25 per cent to 90 per cent.

Trachoma was found to be generally prevalent in the schools to a greater degree than in the reservations from which the pupils are drawn, and in nonreservation boarding schools it was found that groups of pupils, from areas where trachoma is absent or but slightly prevalent, presented a high percentage of infection. This renders the inference reasonable that these pupils contracted the disease at such nonreservation boarding schools, and on their return to their homes they may be the means of implanting a disease in territory where it is now absent or uncommon.

Prevalence of trachoma in day schools.—The data collected for day schools were not so complete as those for boarding schools for the reason that many of the camps were visited on days when the day schools were not in session and others were located in inaccessible situations. Nevertheless, from the records of the examination of 3,488 day scholars, 752 cases of trachoma were found, a percentage of 21.55. The highest percentage of trachoma found among the day scholars was on Arizona reservations where, out of 990 Indian day-school children examined, 41.31 per cent were trachomatous. This is greatly in excess of the general rate (24.9 per cent) found for the State. On the other hand, in New York, out of 335 pupils examined, none had the disease. The investigations in all the other States showed trachoma to be present among the Indian day scholars.

If we exclude from the above-mentioned figures the relatively large proportion of New York day scholars in whom no trachoma was found, we find the prevalence, exclusive of this State, is 24 per cent. This is in excess of the general average found for the total examinations, but it is considerably below the percentage found in boarding schools. As the prevalence of trachoma in day schools seems, in most instances, to correspond in general with the prevalence of the disease on reservations, the inference is strengthened that the high rate of trachoma found in boarding schools is due to its spread among the inmates of those institutions.

Prevalence of trachoma among reservation Indians.—On examination of the reports of the several officers engaged in this work, it appears that 17,822 reservation Indians were examined. This group consisted of individuals above and below the school age. Of this number 3,064, or 17.2 per cent, were found afflicted with trachoma. The prevalence in this class is seen to be distinctly below the rate found for the total number examined, the boarding-school rate and the day school rate. Owing, however, to the greater average age of the individuals, the majority of instances of visual damage was found in this group. States showing a high rate of prevalence were Oklahoma with 60.40 per cent, Utah with 39.2 per cent, Wyoming with 37.26 per cent, Nevada with 36.5 per cent, and Montana with 30.76 per cent.

Incidence according to sex, age, and degree of Indian blood.—It was found that the incidence of the disease falls heaviest on those of school age, over 50 per cent of the trachomatous being between 6 and 20 years of age. Out of a group of 10,425 Indians in all sections of the country there were 5,303 males with 984 cases of trachoma and 5,122 females with 1,083 cases. The incidence is, therefore, slightly higher in the female. The incidence was found to be higher in full bloods than in mixed bloods. This appears to be attributable, however, to the more prosperous circumstances and better living conditions among the mixed bloods.

Damage to vision due to trachoma.—From data compiled in a group of 23,560 Indians examined 5,505 had trachoma, of which 527 showed marked damage to vision. These injuries were of the usual type and consisted, variously, of corneal ulcers, corneal opacities, pannus, entropion, etc. In 141 individuals the damage consisted in blindness of one or both eyes. This by no means represents the extent of visual damage among Indians due to trachoma. A large proportion of those examined were among school children in whom the disease had not as yet sufficiently progressed to produce complications. Competent authorities, however, consider that 75 per cent of untreated trachoma cases result in permanent injury to the vision.

Source and duration of trachoma infection among the Indians.—No reliable data could be obtained by which the origin and duration of the disease among the Indians could be determined. On the whole it appears that trachoma has been prevalent among Indians in widely scattered sections for many years, but the source of the infection among them will, in all probability, remain a mystery.

PREVALENCE OF TUBERCULOSIS AMONG THE INDIANS.

Although no accurate data could be obtained relative to the time tuberculosis has existed among the Indians, the records of the Indian Office show an increasing prevalence of the disease among them and the fact has been emphasized in various reports submitted from time to time.

Owing to the extensive territory to be covered and the short available time, officers engaged in this investigation found it impracticable to employ methods other than the inspection and physical examination of suspects. Time limitation also precluded more than one examination of individuals suspected to be tuberculous. Two officers, however, employed the tuberculin (Von Pirquet) test on 1,225 children.

By reason of these limitations placed upon the examination it is believed that the prevalence of tuberculosis reported by the officers engaged in these studies is lower than that actually existing among the Indians visited. The large number of school children it was necessary to inspect for the incidence of trachoma likewise reduced the amount of tuberculosis reported for the reason that the regulations of the Indian Office, excluding tuberculous children from school, are generally observed. This resulted in finding an artificially reduced prevalence of tuberculosis in a proportionately large group of those examined. It was, nevertheless, found that tuberculosis is widely spread among the Indians.

Considerable variation was noted in the case incidence of the disease, the percentage of tuberculous Indians varying in the several States and on the different reservations in the same State. The more primitive the Indian, generally speaking, the higher was the percentage of tuberculosis. The rate was relatively low among the prosperous Southern Utes at Navajo Springs, Colo., and extremely high among the Paiutes of Nevada, the rate of incidence reaching 32.67 per cent among the Paiutes of the Pyramid Lake Reservation. The observed incidence was also high on some of the Oregon reservations—24.56 per cent on the Siletz Reservation, 20.27 per cent at Klamath Lake, 20.66 per cent on the Umatilla Reservation, and 22.75 per cent at the Warm Spring Reservation. The lowest incidence for a State was observed in New York with a case rate of 1.27 per cent. These Indians are in an advanced condition, are self-supporting, and their mode of life does not differ materially from that of the white rural dweller.

In the Northwestern and Northern States the incidence of tuberculosis varied from 15 per cent for the Sac and Fox Indians of Iowa and 12.14 per cent for the Montana Indians to 2.33 per cent for those of Michigan, while in the Southwest a considerable variation for the different tribes was noted, the Jicarilla Apaches of New Mexico and the Walapais of Arizona giving high percentages of infection, 9.45 and 14.96, respectively. The lowest percentages in these States were reported among the Navajo and Zuñi Tribes in New Mexico, who are prosperous and well fed.

The Von Pirquet test, referred to above, was applied to 1,225 school children in New Mexico. With reference to white children, McNeil reports (Edin. Med. Jour., April, 1912) positive reactions to this test among 531 white children to range from 14.1 per cent for children under 1 year to 55 per cent in girls from 11 to 14 years of age and 60.5 per cent in a group of boys of the same age.

Smith, who applied this test to the Indian children of New Mexico, found a considerably higher percentage of positive reactions than those above referred to, in one instance 95.5 per cent of the children over 11 years giving the reaction. This was among the Jicarilla Apaches who gave the highest incidence of clinical tuberculosis in any tribe he examined. On the other hand, in the case of the Taos Indians, among whom 4 deaths only had been recorded from tuberculosis, the percentage of children giving a positive reaction to the Von Pirquet test was but 1.42. No case of clinical tuberculosis was found among these Indians, and 2 of the cases referred to contracted the disease at a nonreservation boarding school.

On the whole it may be said that the prevalence of tuberculosis among Indians is very greatly in excess of that among the white race, depending on locality, and the survey as conducted has revealed a situation so serious as to require the prosecution of vigorous measures for its relief.

PREVALENCE OF SMALLPOX AMONG INDIANS.

Only 6 Indians of the 39,231 inspected were found suffering from smallpox at the time of the examination. The records examined at the various reservations furnished data which were generally unsatisfactory as to the past prevalence of smallpox. The last severe epidemic among the Indians took place among the Zuñis of New Mexico in 1899 when 555 deaths occurred, and, according to trustworthy information, 900 freshly pock-marked Indians were counted after the epidemic. Since then minor outbreaks have been noted from time to time on reservations in various parts of the country, but the prevailing type of this disease has been mild and but few deaths have resulted.

Thoroughness of vaccination among Indians.—It is estimated that in Arizona there are 23,000 Indians who have not been vaccinated. Apart from this large body of unprotected Indians, the rest of the Indian population may be said to be vaccinated with a fair degree of thoroughness. A lack of thoroughness in the vaccination of those of the school age was observed among Indians in certain sections and, unless steps are taken to correct this deficiency, there is danger of the growth of an unvaccinated generation.

On the whole it may be said that smallpox has not prevailed to any extent among Indians of recent years, and that vaccination is probably as thorough among the Indians as among whites in the average rural community.

As the incidence of smallpox should be nil in a well-vaccinated community, the occurrence of occasional cases of smallpox among the Indians is evidence that vaccination among them has not as yet been practiced with sufficient thoroughness. As obedience to sanitary laws is as much the duty of Indians as of others, superintendents and agency physicians should be held strictly accountable for the control of smallpox in the Indian population.

PREVALENCE OF OTHER INFECTIOUS AND CONTAGIOUS DISEASES AMONG THE INDIANS.

Typhoid fever.—No case of typhoid fever was met with on reservations or in schools among the Indians inspected and such records as were available at schools and agencies showed the disease to be very uncommon among them. This is surprising in view of the existence among Indians of conditions apparently favorable to its spread, but its rarity may be partly accounted for (1) on the ground that the disease has not as yet been extensively introduced among them; (2) that the the Indian's water supply is comparatively safe as, in most instances, he lives at a distance from his sources of drinking water and owing to the low annual rainfall on many Indian reservations and the impermeability of the subsoil, the chances of pollution of sources of water supply through seepage or surface washings are reduced; (3) the Indian is a nonmilk drinker, hence an important agency for the spread of typhoid fever in white communities becomes nonoperative in his case.

It may be expected, however, when the Indian is brought into closer contact with white populations that typhoid fever will become increasingly prevalent in the Indian race.

Measles is common among Indians and outbreaks in the Southwest have been attended with a considerable mortality. In the Northwest, while outbreaks are frequent, .the type of the disease has seemed milder.

Scarlet fever is rare and but one case was encountered during the investigation. The disease is infrequently reported in agency morbidity records.

Diphtheria, according to agency physicians, is rare among the Indians. The Mescalero Apaches seem to have presented the highest incidence, 19 cases having been noted in the two years ending June 30, 1912.

Whooping cough is common among the Indians, and in infants is attended with the usual high mortality.

Chicken-pox and mumps are frequently met with in Indian populations, but are unattended with mortality.

Epidemic cerebrospinal meningitis is rare. During the epidemic of this disease in Oklahoma in 1911 and 1912, out of 902 cases, 17 or 18 were in Indians. Five cases and 2 deaths occurred at the Cheyenne and Arapaho School at Lawton.

Infantile paralysis.—The occurrence of cases of infantile paralysis was reported on the Flathead and Blackfeet Reservations in Montana in 1911.

Malaria was reported to be prevalent among the Indians in the southern and eastern parts of Oklahoma. The Indians of this section suffer in about the same ratio as do the whites.

Venereal diseases.—Contrary to the general impression, venereal diseases seem uncommon among reservation Indians. Syphilis seems more infrequent than gonorrhea, but there was no evidence found of extensive prevalence of either disease.

Contagious skin diseases.—Of the contagious skin diseases, impetigo contagiosa and scabies are the most common among Indians.

Hookworm infection was reported among the Cherokees of North Carolina. In 1911, 41 per cent of the children examined in the Cherokee boarding school were found to be infected with the disease.

Rocky Mountain spotted fever.—One case of this disease was reported on the Wind River Reservation in Wyoming. Cases are reported annually among the white residents in this section. The disease here is mild.

INSANITARY CONDITIONS FAVORING THE SPREAD OF CONTAGIOUS AND INFECTIOUS DISEASES AMONG THE INDIANS.

The sanitary conditions on reservations were found on the whole unsatisfactory. The Indians' houses are small, usually overcrowded and leave much to be desired from the standpoint of cleanliness. The primitive Indians themselves were found to be careless and dirty in their personal habits and generally ignorant of the first principles of hygiene. Their personal and social habits favor the spread of disease, as they are careless about spitting and the disposition of human and household waste. Their fondness of visiting, together with dances and social gatherings which are attended by the sick and the well, afford opportunity to spread any communicable disease which is present.

Owing to their improvidence and racial indolence and poverty, their food supply on the whole is scanty and inferior, thus lowering vital resistance and increasing the predisposition to disease.

Flies are also numerous on reservations on account of breeding places created by accumulations of filth of various kinds and may play a part in the dissemination of tuberculosis and trachoma among the Indians.

Schools.—The schools, generally speaking, were overcrowded or, owing to disproportion in the sexes present, schools with an enrollment below the rated capacity might have more pupils of one sex present than the accommodations warranted. In many instances overcrowding in the dormitories existed.

The regulations of the Office of Indian Affairs, calling for separate towels for each pupil were generally complied with, but in most instances, the manner of disposition of the towels was faulty, as when not in use, they were hung up in such manner as to permit the transfer of infection from one towel to another.

Trachomatous pupils in most schools were allowed to mingle freely with healthy pupils in the classrooms, dormitories, and at play. The washing and toilet facilities were, in many instances, inadequate, of obsolete pattern, and frequently in a state of disrepair. The water supply in some schools was inadequate or was rendered defective through faults in the plumbing. The schools were also generally found imperfectly screened against flies with the exception of dining rooms and kitchens. The medical and sanitary supervision also left something to be desired.

THE BEARING OF THE PREVALENCE OF CONTAGIOUS AND INFECTIOUS DISEASES AMONG THE INDIANS ON THE HEALTH OF OTHER RACES.

The high prevalence of trachoma and tuberculosis among the Indians is of importance not only with respect to the Indian but also to other races. Many counties on Indian reservations are being opened to white settlement, and the Indian is in a gradual process of assimilation with the rest of the population. The future development of transportation also will tend to bring the Indian into closer contact with other inhabitants. The control of communicable diseases among Indians and the prevention of their spread to other races is, therefore, indicated as a public-health measure.

Medical Branch of the Office of Indian Affairs.

It was found that the curative efforts of the physicians of the Office of Indian Affairs were largely nullified by the conditions under which work is attempted and by the indifference and ignorance of the primitive Indian. The important problem is not so much the medical treatment of the Indian for disease as the improvement of insanitary conditions causing such diseases.

Under existing regulations agency physicians are subordinate to agency superintendents in medical and sanitary matters, and such superintendents are not in many instances sufficiently impressed with the importance of health problems. The status of the agency physicians was found to be unsatisfactory from the standpoint of inadequate compensation, lack of organization, and the esprit de corps necessary in any great coordinated work.

The reports of sickness and deaths are the foundation of public-health work. Records of these were indefinite and fragmentary on most reservations, and due care was not exercised in all instances in their compilation and preservation.

CONCLUSIONS.

I. Trachoma is exceedingly prevalent among the Indians and this prevalence was found (*a*) highest in Indian boarding schools, (*b*) less in Indian day schools, and (*c*) least among reservation Indians above and below school age.

II. Tuberculosis is very prevalent among Indians. Although the conditions of the investigation did not permit the detection of all the cases which might have been found with more extended opportunities, there is good ground for belief that the incidence of tuberculosis among the Indians is greatly in excess of that estimated for the white population, and the undertaking of immediate means of relief are indicated.

III. Smallpox is little prevalent among Indians at the present time. Evidence was found that the Indian population is vaccinated with approximately as great a degree of thoroughness as the rural white population.

IV. Typhoid fever, contrary to expectation, is less prevalent among the Indians than among the whites. There was no evidence that other infectious and contagious diseases are more prevalent among Indians than among the white population.

V. The conviction can not be escaped that Indian boarding schools have been an important agency in the spread of trachoma.

VI. The sanitary conditions on reservations are, on the whole, bad, and require improvement in housing conditions and habits of living.

VII. The primitive Indian requires instruction in personal hygiene and habits of living, especially in stationary dwellings, and practical education in such matters must be made the basis of future advancement.

VIII. The social habits of Indians (visiting, dances, etc.) may serve to spread any communicable disease present among them.

IX. The presence of numerous flies on reservations is believed to be a factor in the spread of tuberculosis and trachoma.

X. The sanitary conditions in most Indian schools are unsatisfactory because of one or more of the following conditions: Overcrowding, inadequate equipment, imperfect sanitary supervision, and lack of observance of necessary sanitary precautions.

XI. There is danger of the spread of tuberculosis and trachoma from the Indian to other races by reason of the increasing intercourse taking place between them.

XII. Due care is not exercised in the collection and preservation of records of morbidity and mortality at many schools and agencies. Such records are the foundation of public-health work.

XIII. The medical branch of the Office of Indian Affairs is hampered in accomplishing effective work in curing and preventing diseases (*a*) because of insufficient authority in medical and sanitary matters (*b*) because of existing obstacles, such as racial characteristics, present economic status of the Indian, and varying physical conditions on reservations; (*c*) because of inadequate compensation, absence of reasonable expectation of promotion, lack of esprit de corps and coordinated organization.

XIV. Present measures for the sanitary betterment of the primitive Indian are not, in many instances, adapted to his needs and condition of life. In devising practical sanitary measures account must be taken of his racial status.

XV. In any event, the suppression of tuberculosis and trachoma among Indians will be difficult. Long-continued efforts and the expenditure of considerable funds will be required.

RECOMMENDATIONS.

In view of the conditions found and the conclusions arrived at, and, in response to the requirements of the act providing for the investigations herewith reported, it becomes necessary to make recommendations bearing on the control of contagious and infectious diseases among the Indians. It is proper to state here, however, that while conditions were found which would suggest the making of numerous recommendations, attention is devoted mainly to general problems, and even these are modified by reason of varying local conditions.

The recommendations herewith submitted are, therefore, considered from the standpoint of the general Indian population, and in working out methods of their local application due account must be taken of circumstances peculiar to various localities.

In the practical application of these recommendations, consideration must necessarily be given to the racial characteristics of the Indian, his present economic condition, his degree of education, and his status as a citizen or a ward of the Government. Many measures that will be effective in a well-organized community and among an educated people would manifestly be impracticable of general application among primitive Indian tribes. The recommendations, therefore, are of a primary nature and intended to meet the present problems from a general standpoint.

They deal with the following subjects: (*a*) the improvement of sanitary conditions among the Indians; (*b*) the control of trachoma; (*c*) the control of tuberculosis; and (*d*) the control of smallpox.

Whenever necessary and practicable cooperation should be had with State boards of health in putting these recommendations into effect.

THE IMPROVEMENT OF SANITARY CONDITIONS AMONG THE INDIANS.

As the wide prevalence of infectious and contagious diseases among the Indians, notably trachoma and tuberculosis, depends largely upon the ignorance and indigence of the Indian, and absence of central and local organization in the administration of sanitary matters among them, the following recommendations are made:

1. The economic status of the Indian should be improved. Improvement in such status is necessarily directed toward causing the Indian to become self-supporting so that at all times his food supply will be regular and sufficient. The Indian, therefore, should have closer and more practical supervision and encouragement in the tilling of his land and the raising of crops. In localities where agriculture is not profitable, he should receive similar encouragement and supervision in other occupations suitable to his needs and environment. It would appear that the reservation is the best place to encourage young Indians in individual effort, acquisition of property, and the appreciation of property rights.

2. Efforts should be made in greater degree to educate the Indian in personal and domestic hygiene and the means necessary to guard against contagious and infectious diseases.

In combating diseases, educational measures have been found to be most important and can not be neglected. Such education should be more widely attempted by means of home-instruction, lectures, demonstrations, moving-picture shows, and by any other means found to be effective.

3. Greater efforts should be made toward the improvement of the houses of Indians. Studies should be undertaken in the design of the cheapest and most sanitary forms of dwellings for the various climatic conditions on Indian reservations, and Indians encouraged and aided, so far as practicable, in the construction of such habitations. All dwellings built in the future should be in conformity with an approved design.

4. In so far as practicable each house should be restricted to the use of but one family, thus avoiding the overcrowding now so common among Indians.

5. Permanent dwellings and camps should be provided with sanitary privies, and their use encouraged.

6. Reservations should be divided into sanitary districts according to size and density of population, each with a medical officer who should be under the immediate supervision and control of the chief medical officer on the reservation, who may also be in charge of a sanitary district. The chief medical officer of a reservation should be held strictly accountable for the sanitary condition of the districts in his jurisdiction.

7. An accurate census should be made as soon as practicable in each sanitary district, and the sanitary condition of all dwellings and the physical condition of each inmate, with special reference to the existence of tuberculosis and trachoma, determined and properly recorded.

8. Regular sanitary inspections of reservations, the dwellings thereon, boarding schools and day schools should be made by the sanitary officers for the discovery and abatement of nuisances.

9. Medical officers should be the sanitary officers of their jurisdictions in fact as well as in name. Their written orders should be enforced by agency superintendents and, in case of nonenforcement, agency superintendents should be required to report the same to the central authority, stating the reason.

10. Medical officers of reservations should be under the supervision and control of a distinctly medical bureau. They should be held strictly accountable to such bureau for the administration of medical and sanitary matters on reservations, and the character of their work should be controlled by frequent inspection.

11. The occurrence of cases of sickness and deaths on Indian reservations should be made a matter of permanent record. A transcript of the records of cases of sickness should be transmitted regularly to the Surgeon General of the United States Public Health Service, and reports of outbreaks of certain specified diseases, such as plague, smallpox, and scarlet fever, should be made by telegraph to this official, whose duty it is, under law, to keep the State and local health authorities and the country at large informed of the prevalence of sickness and the occurrence of epidemics.

12. The physicians to the Indians should be so organized as to insure adequate medical and sanitary supervision on reservations and at boarding schools. Only competent men should receive appointment, and the compensation should be sufficient to retain their services. Unqualified men should not be retained. In medical and sanitary matters the authority of the medical officers should be, in large measure, independent of agency superintendents, and there should be lodged in a central bureau plenary powers in respect to all medical and sanitary matters among the Indians.

CONTROL OF TRACHOMA.

13. Hospital facilities should be provided on reservations for the reception of Indians suffering from severe trachoma and in need of hospital treatment. Sufficient authority should be granted to require them to undergo such treatment when, from the condition of their eyes, they are a menace to the public health. Hospitals for this purpose need not be expensive, and most trachoma cases could receive out-patient treatment.

14. In each infected sanitary district of a reservation a dispensary or office, portable or permanent in character, should be provided for the treatment of cases of trachoma not requiring hospital care, and such dispensaries should be in charge of those qualified to administer treatment for diseases of the eyes.

15. A sufficient number of field nurses should be provided to administer, under the direction of the physician, home treatment and instruction to those who can not be sent to the hospital nor attend the dispensary.

16. The present regulations of the Office of Indian Affairs relating to the physical welfare and sanitary supervision of school children should be strictly enforced and report thereon made regularly.

17. All Indian schools, day and boarding, both Federal and mission, should, at all times, be under competent medical and sanitary supervision.

18. No children suffering from trachoma should be admitted to uninfected schools.

19. Separate schools, where practicable, should be established for trachomatous children.

20. Whenever it is impracticable to establish such separate schools, trachomatous pupils in boarding schools should be strictly segregated from healthy pupils. Separate dormatories, classrooms, diningrooms, and playgrounds should be assigned for their exclusive use.

21. All boarding schools wherein trachomatous pupils are admitted should be provided with adequate facilities for the care and treatment of trachoma, such facilities to include the permanent services of a nurse trained in the care and treatment of diseases of the eye.

22. Systematic medical examinations should be made regularly of all children in schools. This provision is contained in an existing regulation governing schools.

CONTROL OF TUBERCULOSIS.

23. Sanitary districts on reservations should be regularly inspected for the detection of cases of tuberculosis.

24. Specific regulations should be devised for the guidance of those suffering from tuberculosis.

25. All tuberculous individuals who are capable of disseminating infection and who can not live safely in their homes in compliance with such regulations should be removed to a suitable site where they can be properly housed and cared for, and their houses disinfected.

26. Hospital facilities should be provided on reservations for the care of advanced cases of tuberculosis, but these hospitals need not be expensive in construction nor operation, and removal of patients to distant places without the reservation is not advised.

27. Greater efforts should be made to educate the Indian to protect himself against tuberculosis.

28. No children suffering from pulmonary or open case of tuberculosis should be admitted to any regular day school or boarding school, and the pupils developing tuberculosis subsequent to admission should be excluded. For tuberculous children of school age open-air boarding schools might be operated in suitable climates, or school sanatoria established.

CONTROL OF SMALLPOX.

29. The regulations of the Office of Indian Affairs in relation to the vaccination of school children should be strictly enforced.

30. Such individuals on reservations as do not present good vaccination marks on sanitary inspection should be vaccinated.

31. Revaccination of reservation populations should be practiced at regular intervals, and on receipt of the news of the occurrence of smallpox outbreaks in the vicinity of Indian reservations.

It is believed desirable to remove to reservations Indian wards of the Government who are now living in white villages and who by reason of poverty and disease are a menace to the public health. By so doing they can be placed in position to receive medical relief and sanitary supervision.

It is suggested that steps be taken at once by means of a sanitary corps to sanitate some one reservation suffering from a high disease incidence. By this means a demonstration could be given of the practicability and benefits of sanitation, such as has been made among the natives of the Philippine Islands.

○

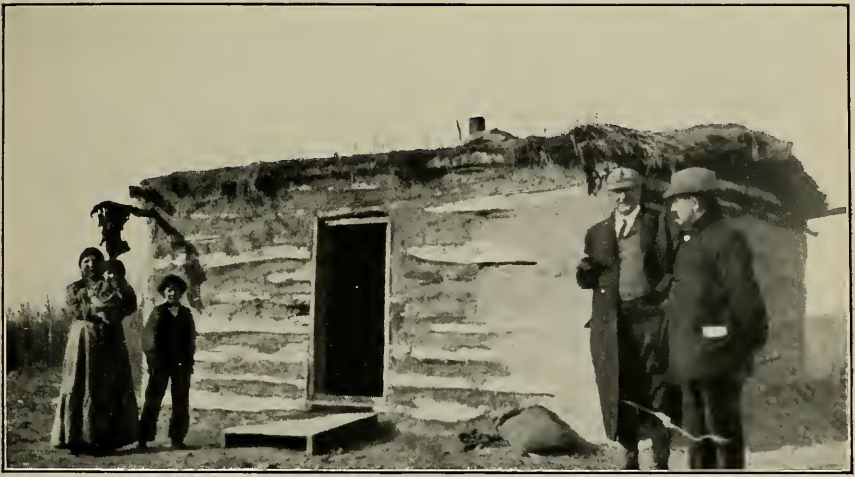


FIG. 17.—SEVEN PEOPLE WITH SIX CASES OF TRACHOMA LIVED IN THIS HOUSE. IT HAS NO WINDOWS.

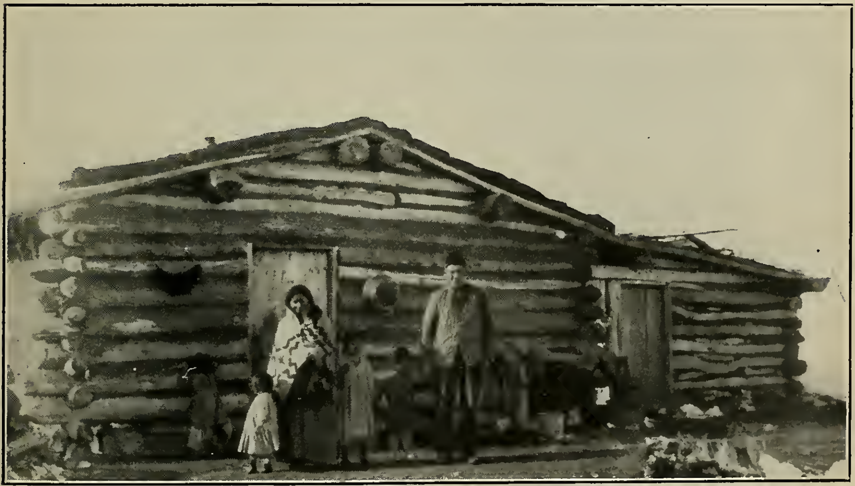


FIG. 18.—TYPICAL INDIAN FAMILY OF NORTHWEST. WIFE AND FIVE CHILDREN HAVE TRACHOMA. FORT BERTHOLD RESERVATION.

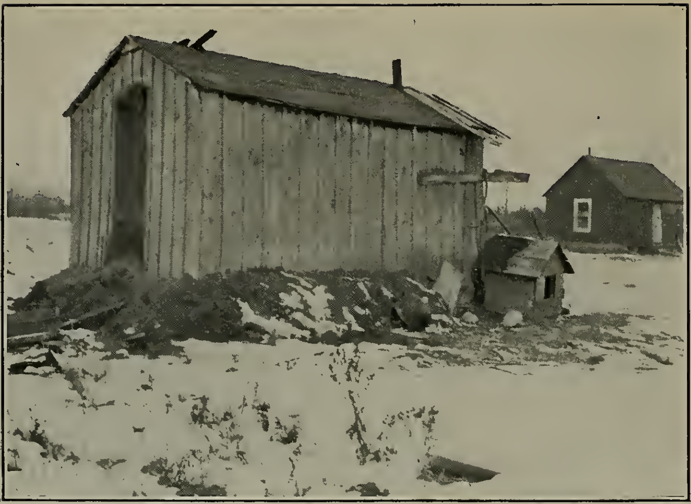


FIG. 19.—INDIAN CABIN BANKED WITH MANURE TO EXCLUDE COLD; NO WINDOWS.

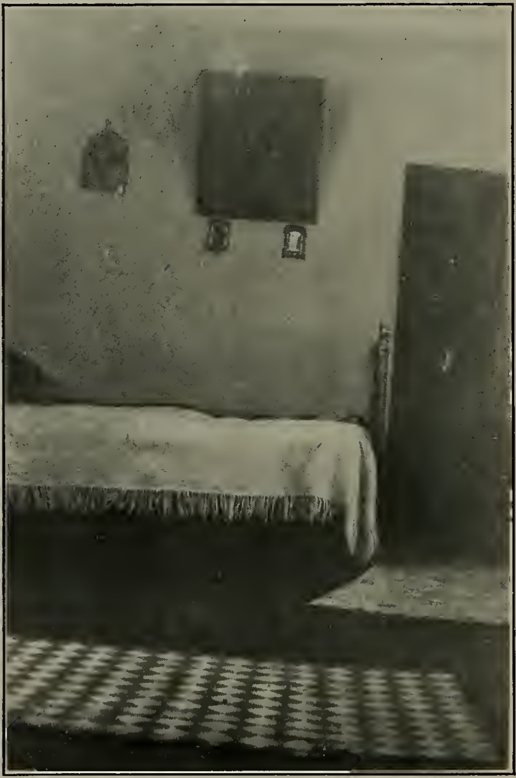


FIG. 20.—THE INTERIORS OF SOME INDIAN HOUSES ARE NEAT AND CLEAN.

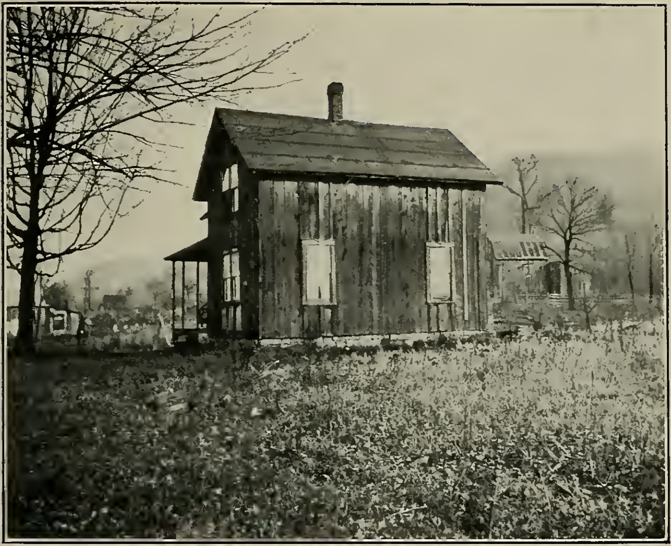


FIG. 21.—A TYPE OF HOUSE FREQUENTLY SEEN, ESPECIALLY ON THE ALLEGHENY RESERVATION, NEW YORK.

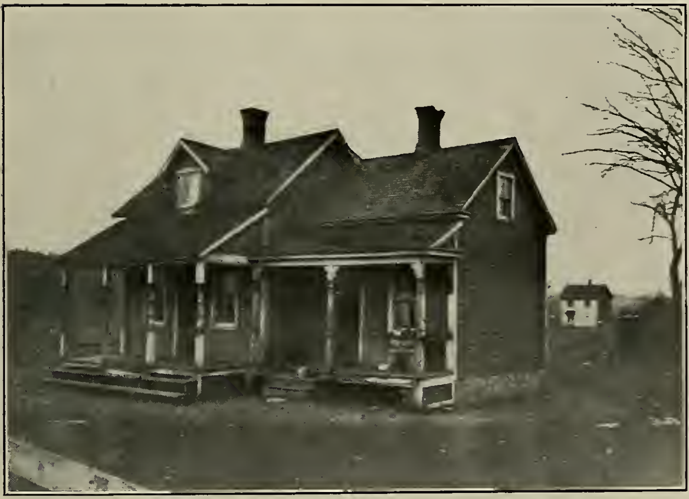


FIG. 22.—ONONDAGA RESERVATION, NEW YORK.

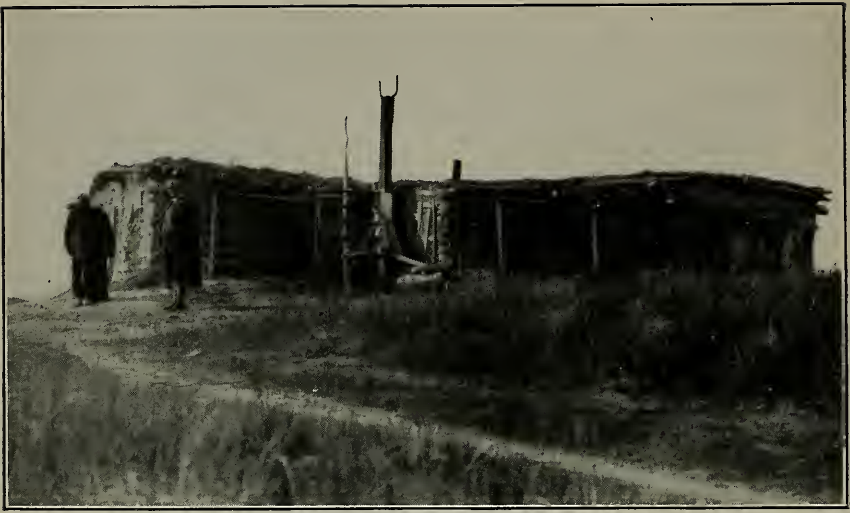


FIG. 23.—DANCE LODGE.

Large numbers of Indians meet in such places and dance all night. A favorable opportunity for the spread of disease is afforded in this manner.

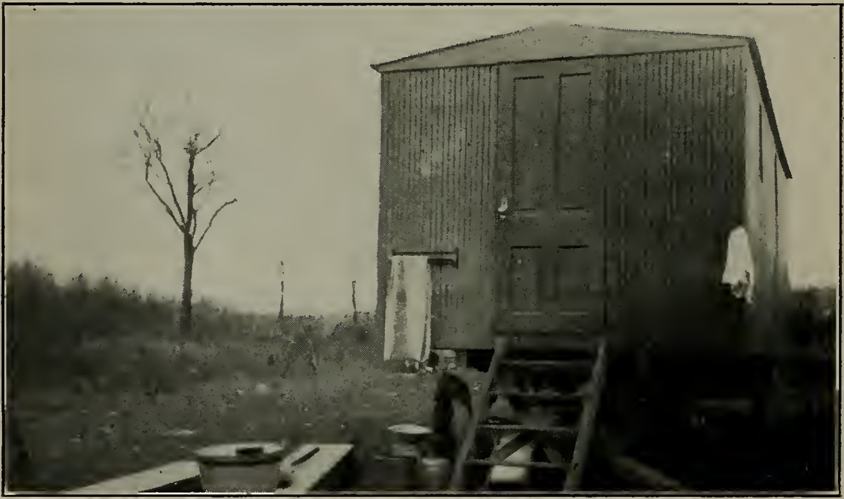


FIG. 24.—COMMON HAND BASIN AND ROLLER TOWEL OF COOK CAR IN THRASHING OUTFIT.

Whites and Indians worked in the crew. Two of the Indians had trachoma.

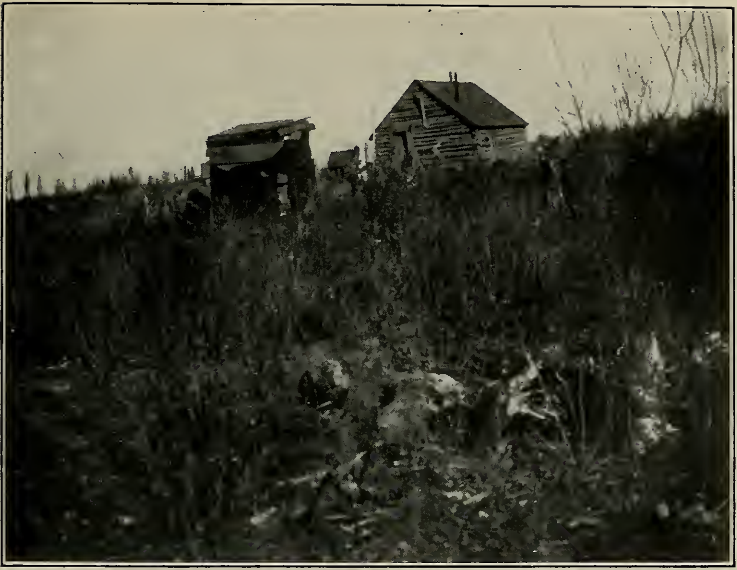


FIG. 25.—TYPE OF PRIVY FREQUENTLY SEEN. FOND DU LAC, MINN.

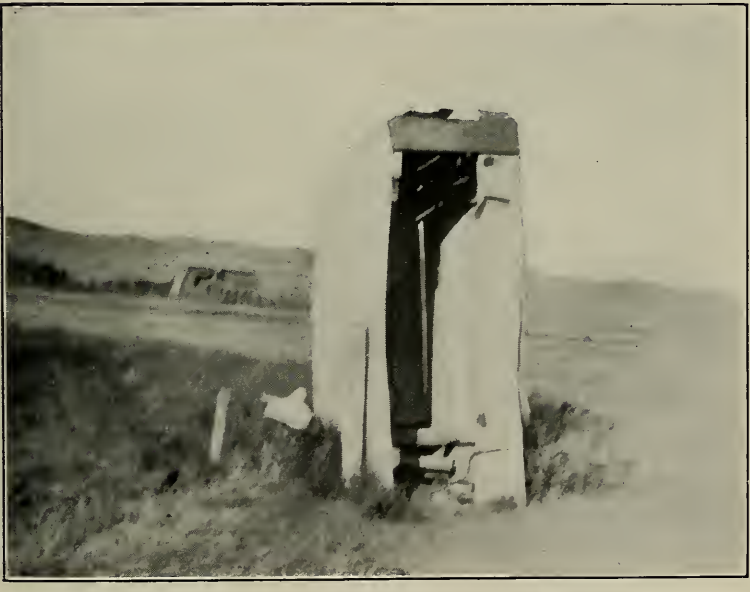


FIG. 26.—AN INSANITARY PRIVY AT LOWER BRULE.

A few similar privies were seen here, but rarely used.

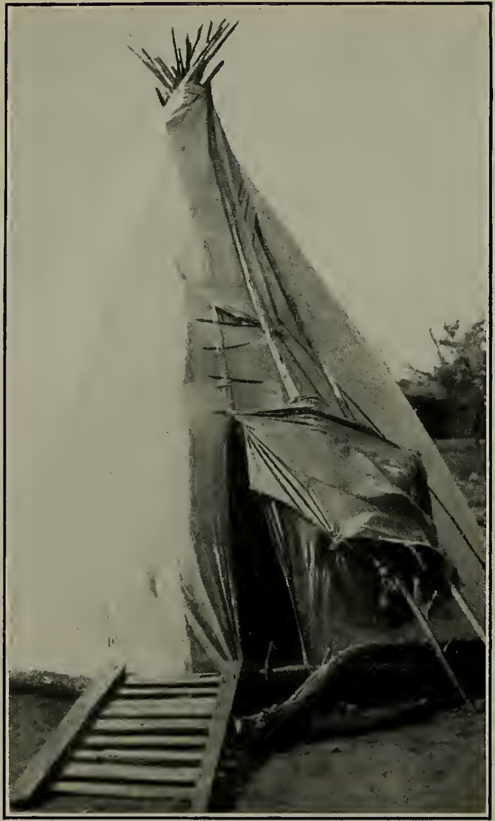


FIG. 27.—TYPICAL INDIAN TEPEE.

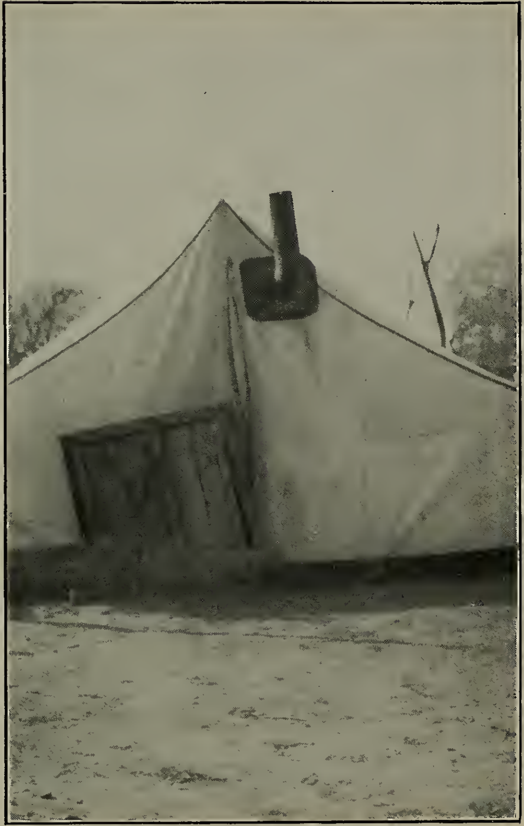


FIG. 28.—TYPICAL INDIAN TENT.

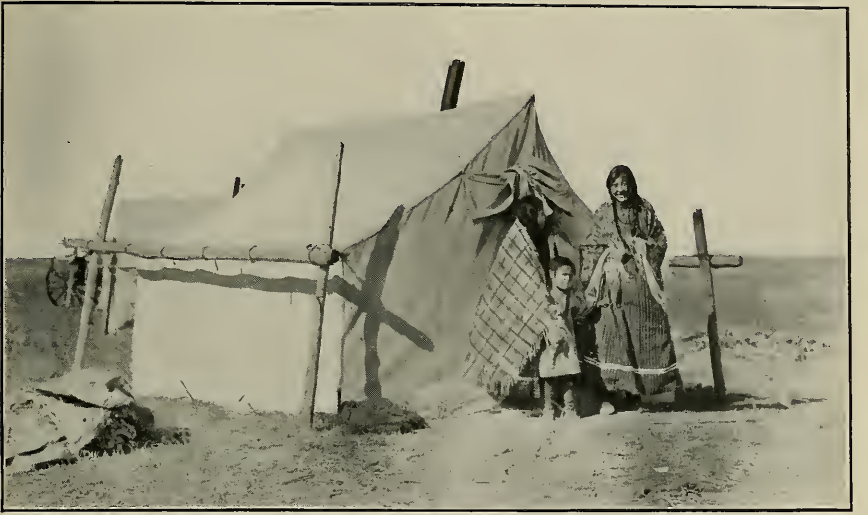


FIG. 29.—ARAPAHO HOME, SHOSHONE RESERVATION, WYOMING.

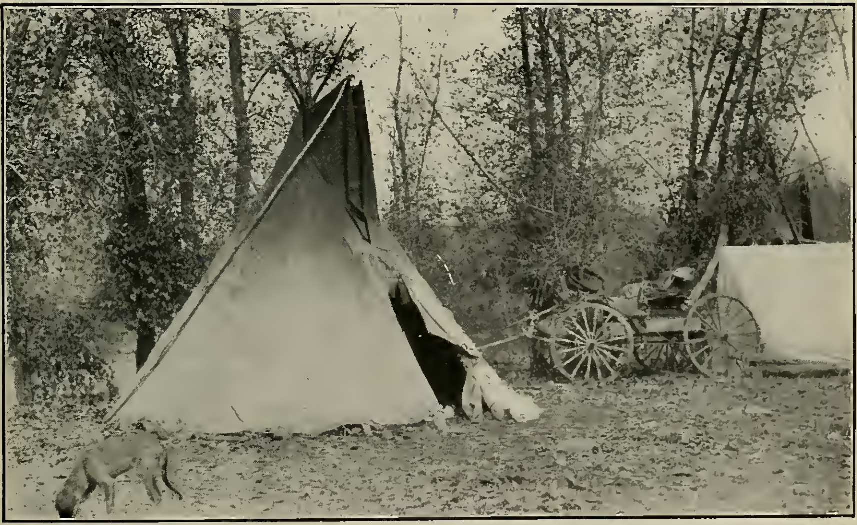


FIG. 30.—AN OURAY TEPEE, UINTAH AND OURAY RESERVATION, UTAH.

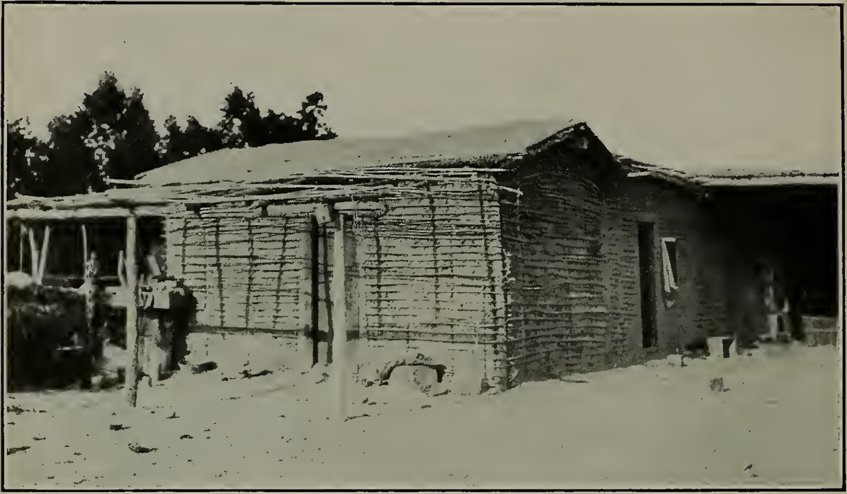


FIG. 31.—ADOBE HOUSE, FORT YUMA, CALIFORNIA.

Only one window and this was nailed up with boards. A tuberculous patient occupied this house.

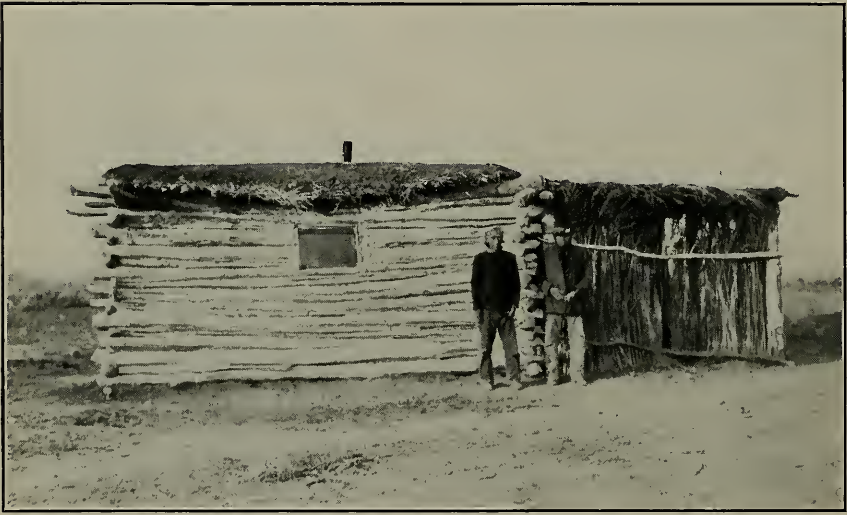


FIG. 32.—CHIEF RED CAP AND HIS HOME, WHITE RIVER INDIAN, UINTAH AND OURAY RESERVATION, UTAH.

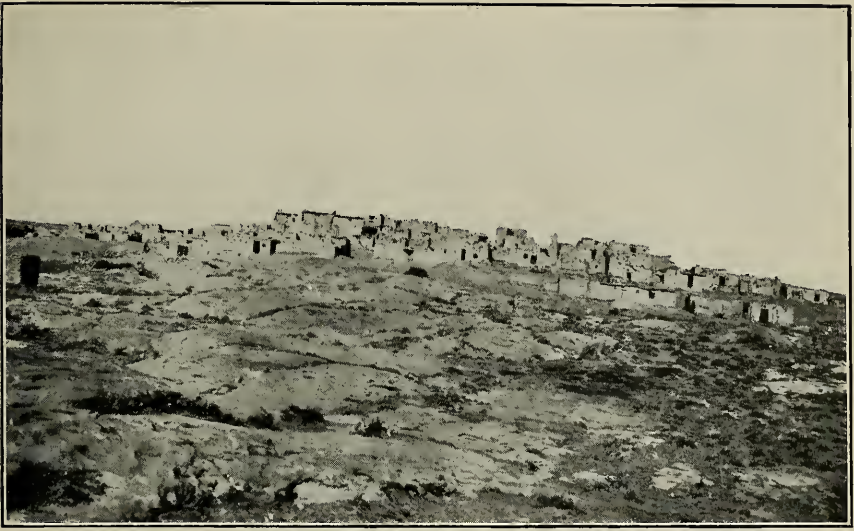


FIG. 33.—HOPI VILLAGE.

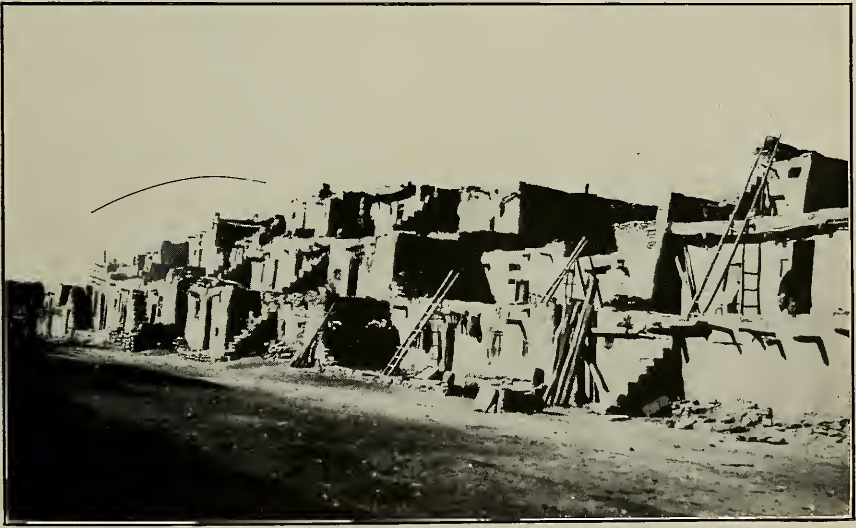


FIG. 34.—LOOKING DOWN A STREET IN HOPI VILLAGE.

The greater part of the garbage is deposited in the street.

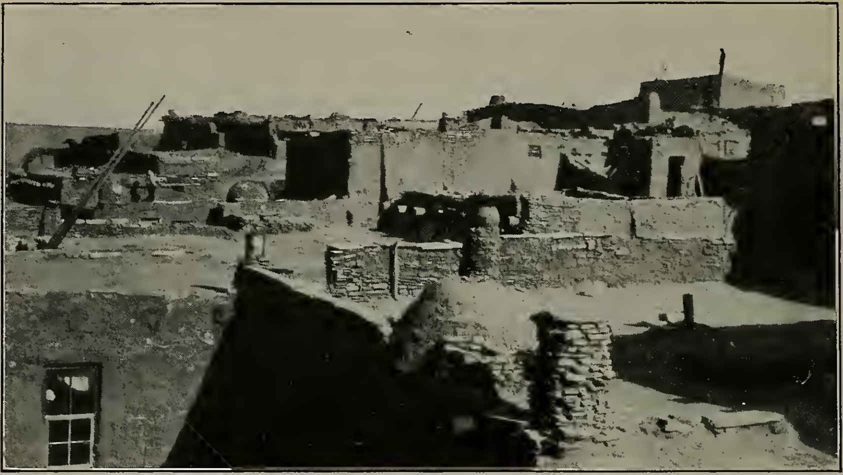


FIG. 35.—VIEW ACROSS THE HOUSE TOPS.

Several of the houses in this picture are entered only from above. Pueblo Indians, Zuni, N. Mex.

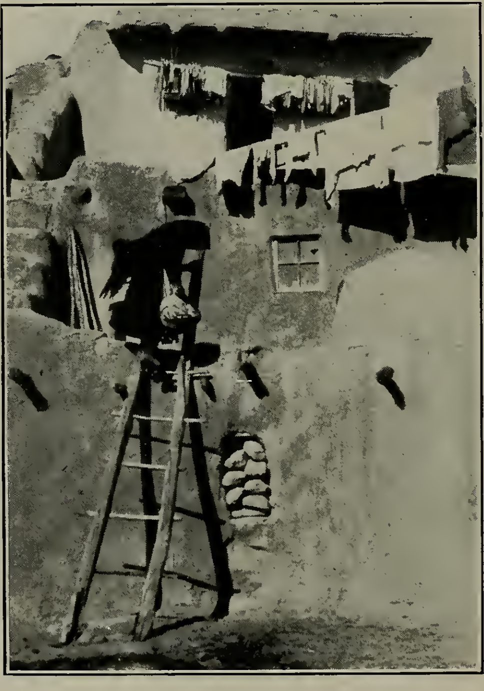


FIG. 36.—THE HOUSES ARE BUILT ABOVE ONE ANOTHER, THE LOWER ONES BEING OFTEN ENTERED ONLY FROM ABOVE. SOME MODERN LARGE WINDOWS, BUT NOT MADE TO OPEN.

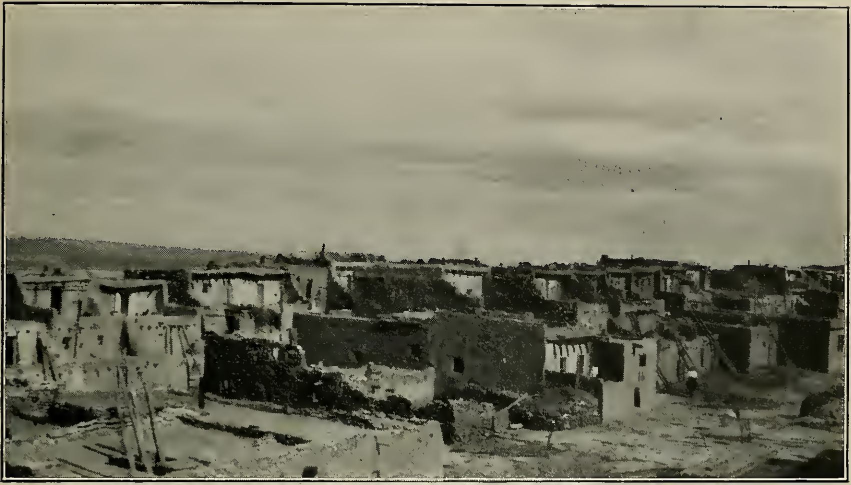


FIG. 37.—A ROW OF HOUSES WITH COURT YARD. PUEBLO INDIANS, SEAMA, N. MEX.

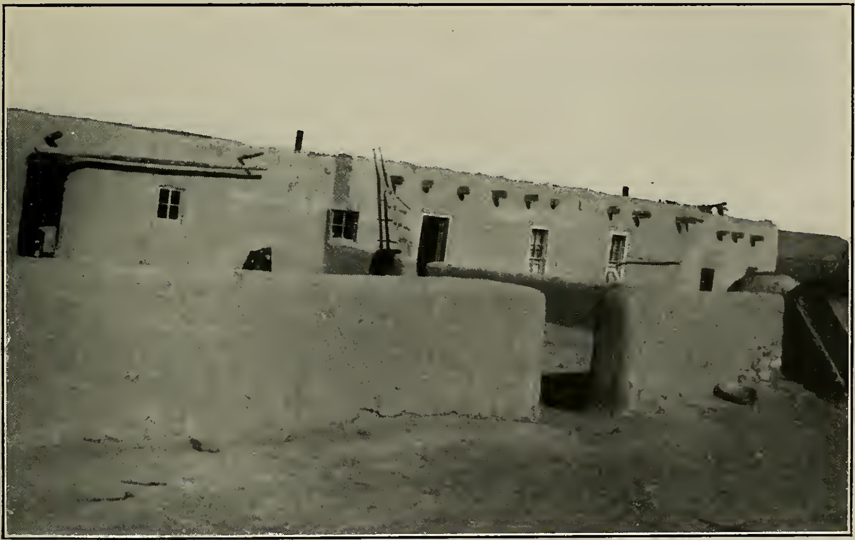


FIG. 38.—AS IN TAOS, THESE HOUSES WERE APPARENTLY BUILT FOR DEFENSE. Large windows are not uncommon, however. Tuberculosis is rare here and trachoma common.

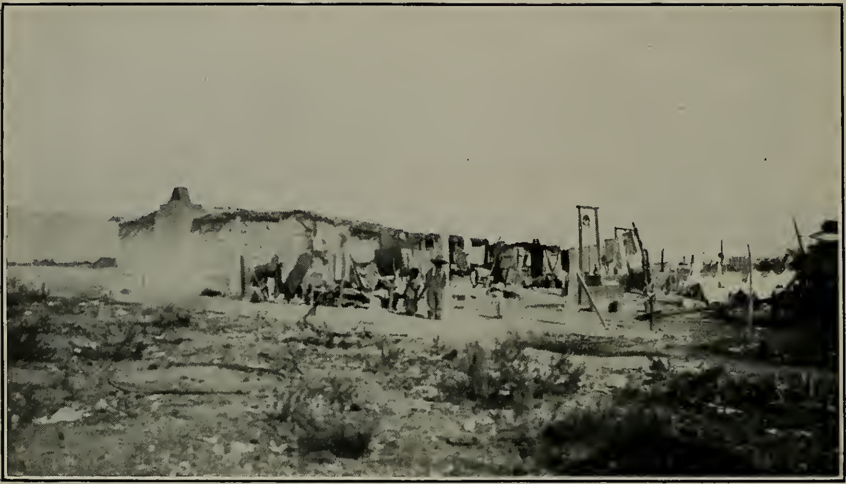


FIG. 39.—PAPAGO BACK YARD, WITH SHALLOW WELL.

Fortunately for the typhoid problem, the water is strongly alkaline. Arizona.

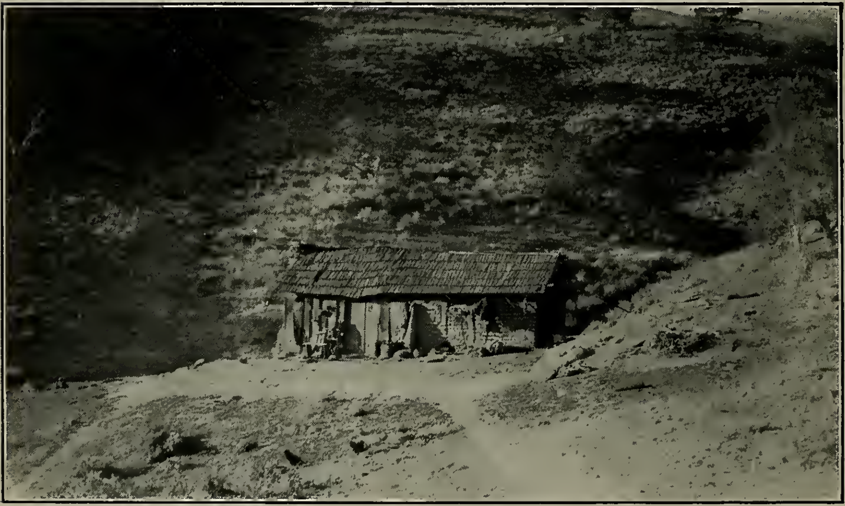


FIG. 40.—HOUSE ON LA JOLLA MISSION RESERVATION, CALIFORNIA. NO WINDOWS.

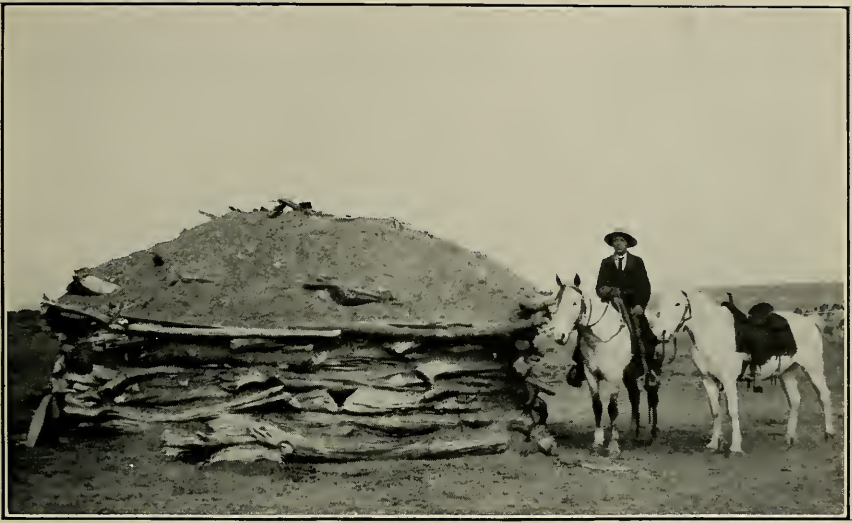


FIG. 41.—A NAVAJO "HOGAN."

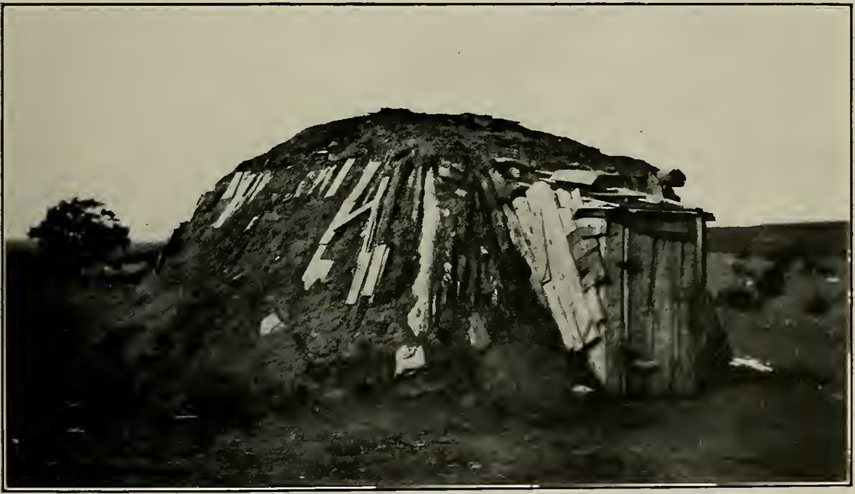


FIG. 42.—A NAVAJO "HOGAN" BUILT OF SLABS AND COVERED WITH DIRT.

When these "hogans" become infected with tubercle bacilli, they probably remain so.

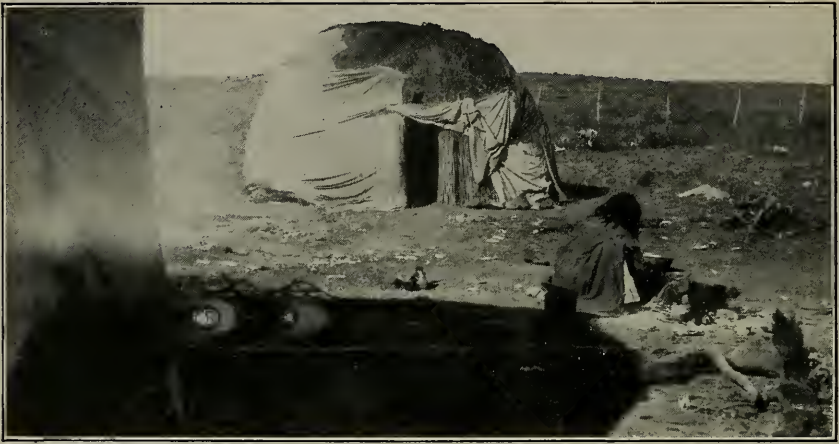


FIG. 43.—TYPICAL APACHE TEPEE, ARIZONA.

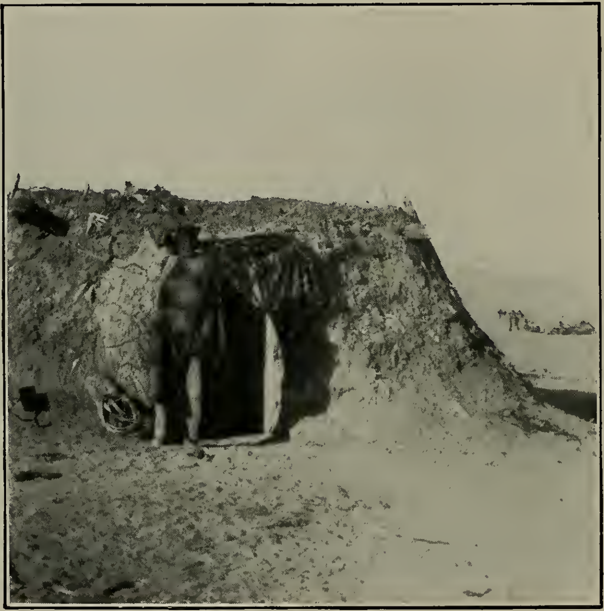


FIG. 44.—NAVAJO "HOGAN."

The large round hole in the top is not shown. New Mexico.

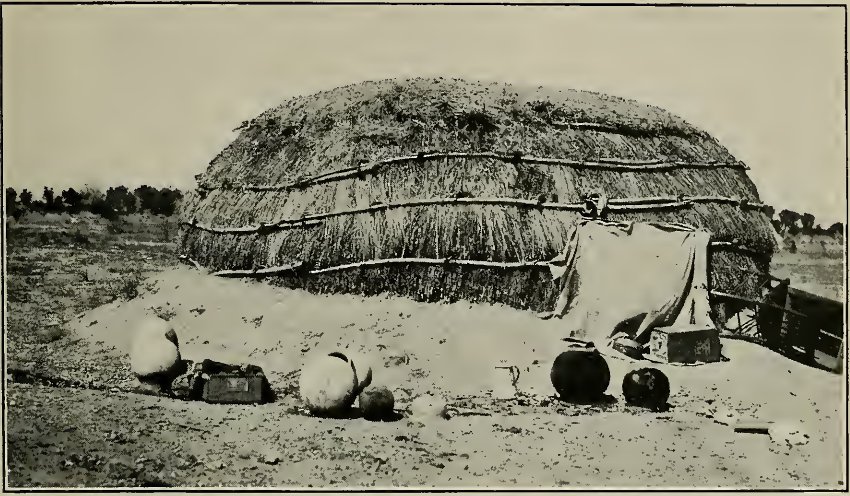


FIG. 45.—OLD PIMA HOUSE IN ARIZONA. QUITE RARE.

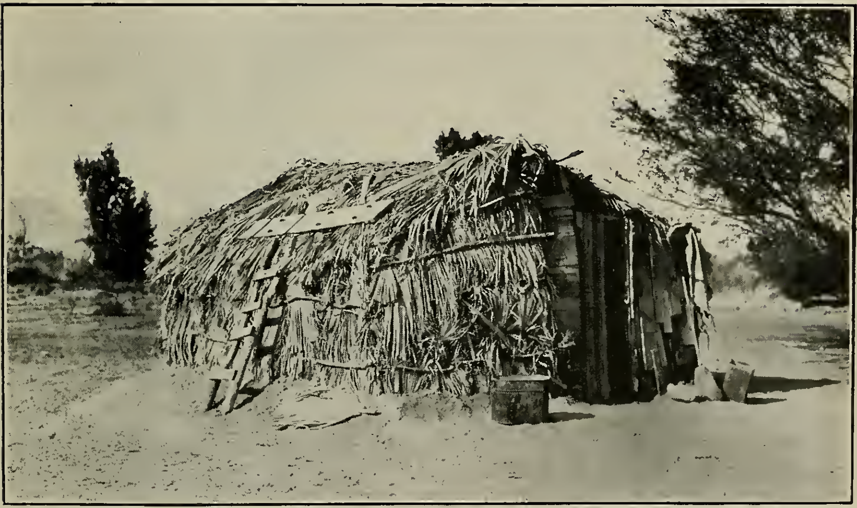


FIG. 46.—PALM-LEAF HOUSE OCCUPIED BY SEVERAL INDIANS, MARTINEZ RESERVATION, MISSION INDIANS, CALIFORNIA.

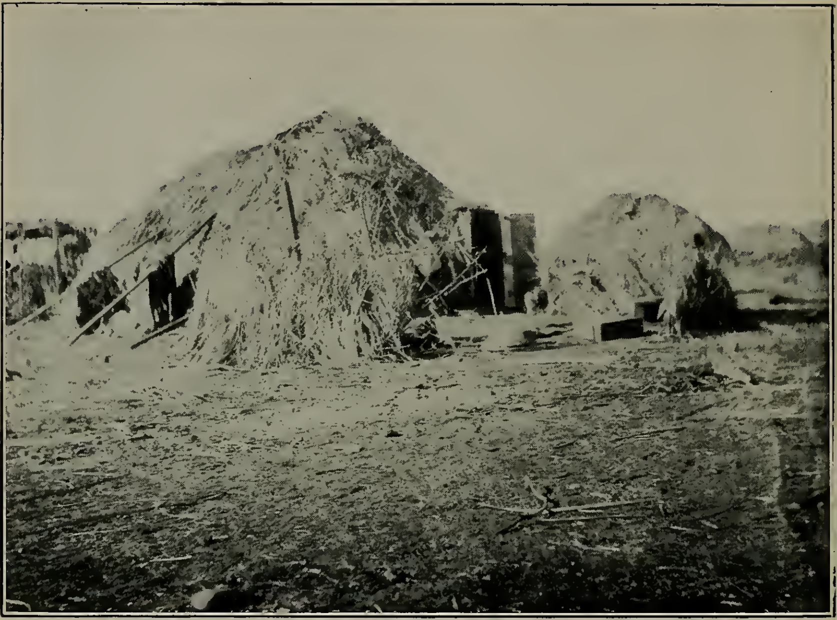


FIG. 47.—APACHE SUMMER TEPEE, FREQUENTLY BURNED FOLLOWING A DEATH.

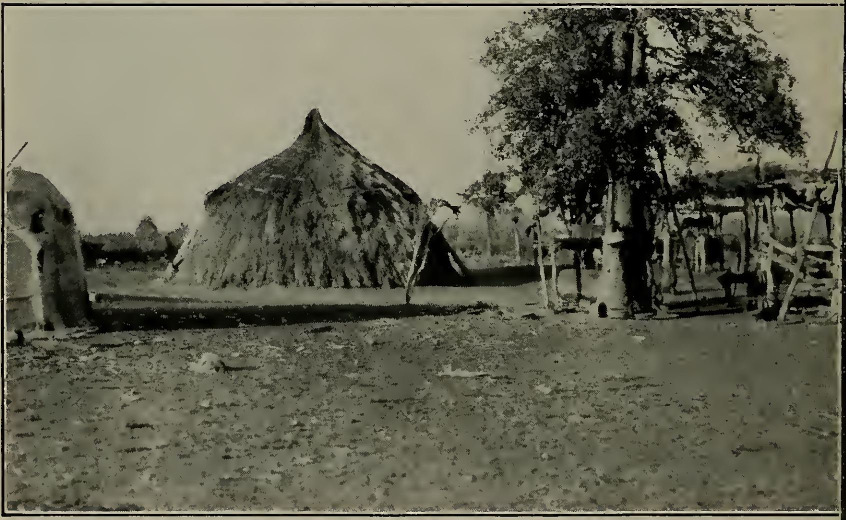


FIG. 48.—WICHITA GRASS TEPEE, KIOWA RESERVATION.

On the right is the summer house.

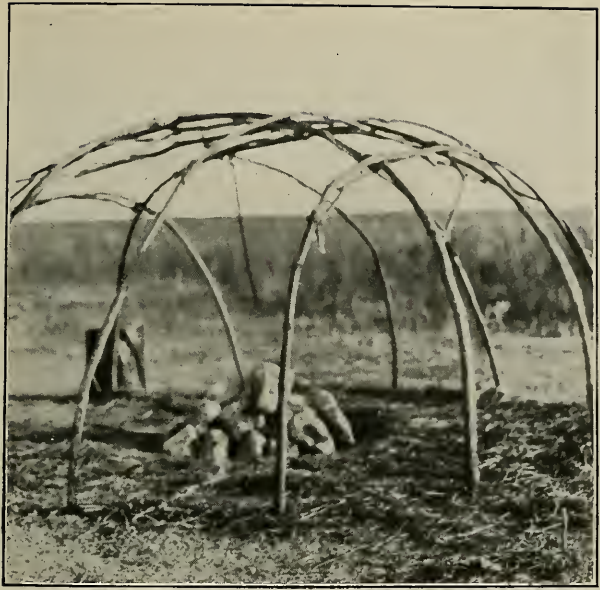


FIG. 49.—INDIAN SWEAT HOUSE.

The framework is covered with quilts, the stones are heated. The Indian enters the house, pours cold water over the stones, thereby generating steam, and taking a kind of Turkish bath.

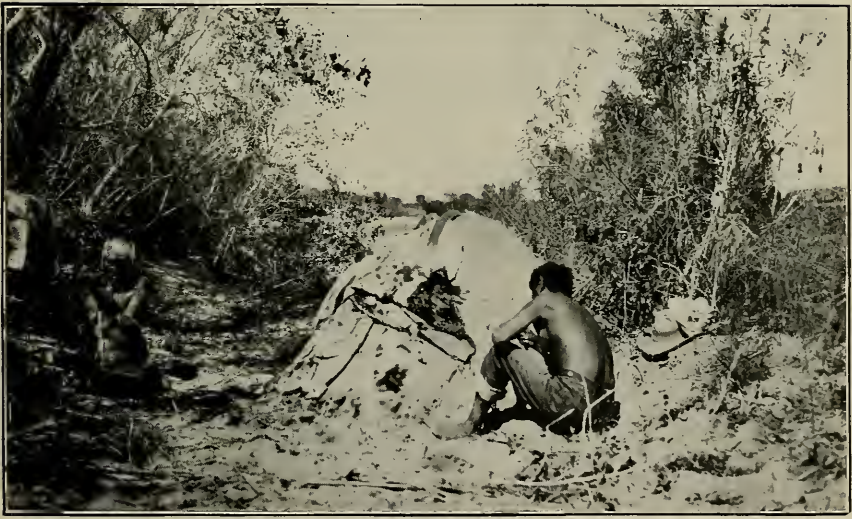
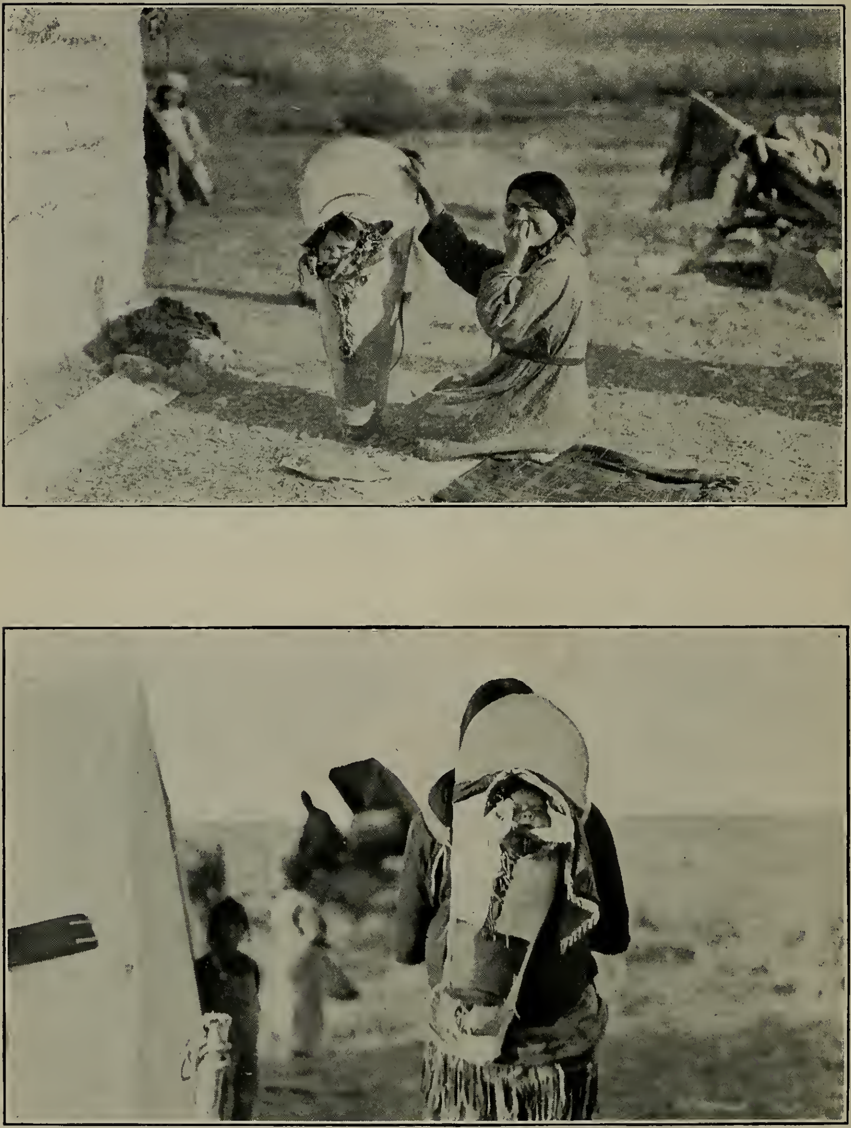


FIG. 50.—FIVE SWEATERS INSIDE.

They sweated 50 minutes, then jumped into the ice-cold San Carlos River just beyond.



FIGS. 51 AND 52.—THE ORIGINAL METHOD OF CARRYING INFANTS, STILL IN USE, SHOSHONE RESERVATION, WYO.

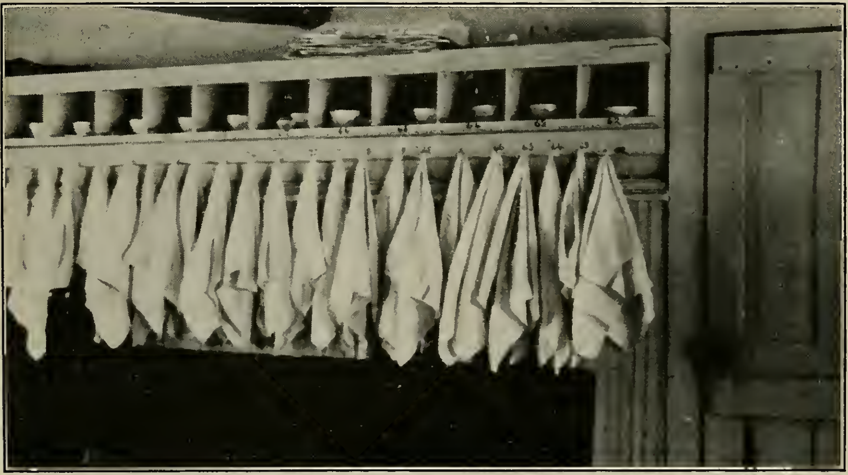


FIG. 53.—SEPARATE TOWELS IN NAME ONLY.

The towels overlap and infection might easily be transferred from one towel to another.

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